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Gas Journal

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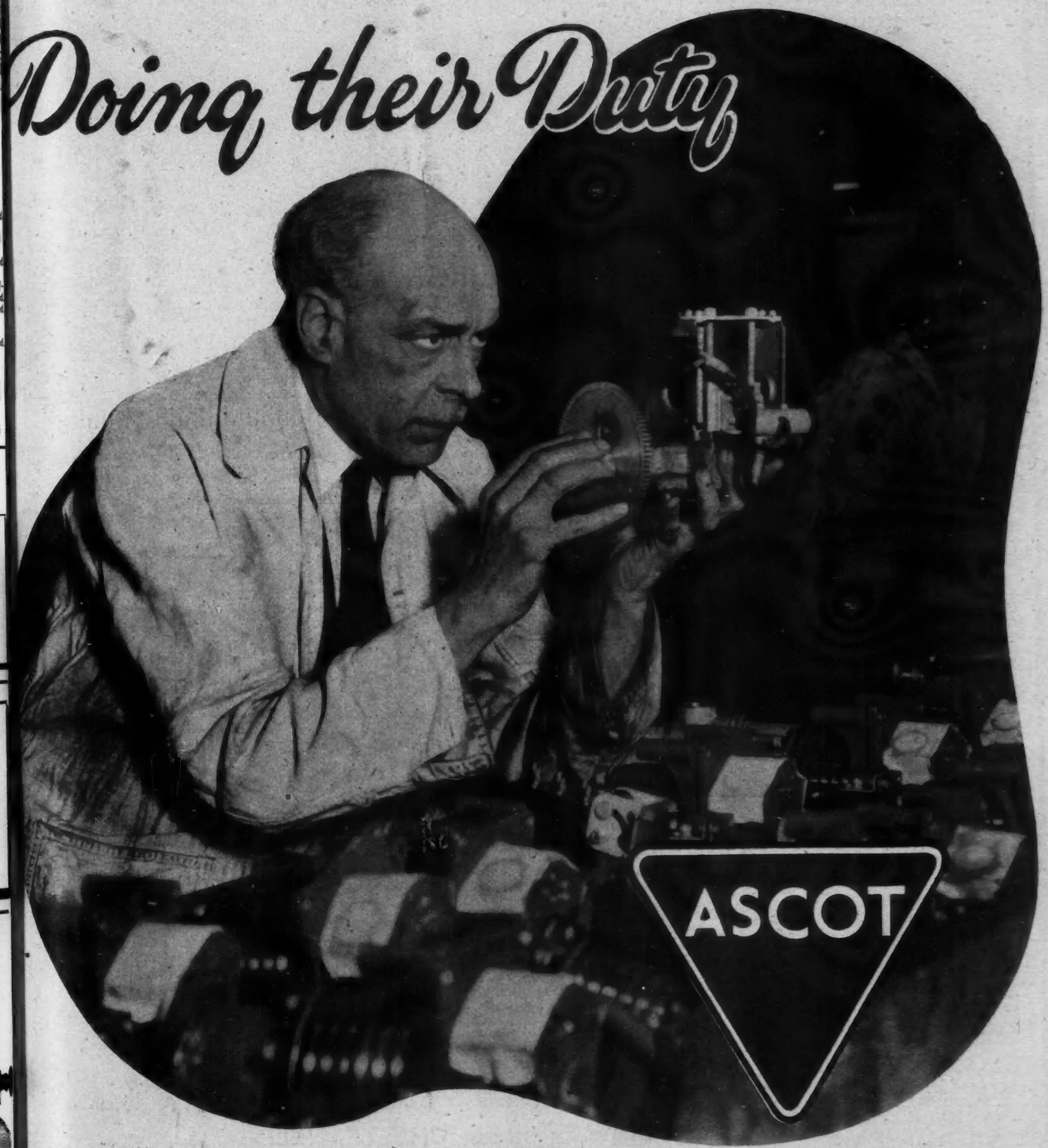

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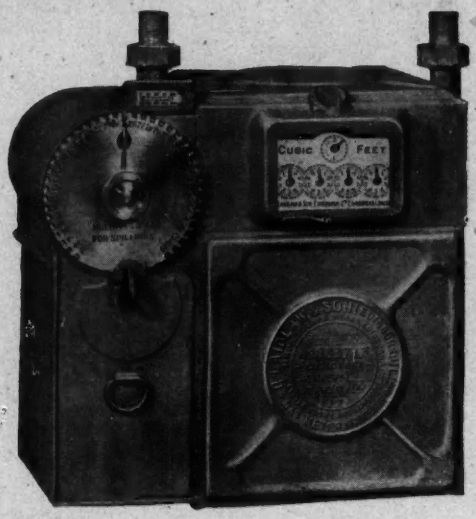

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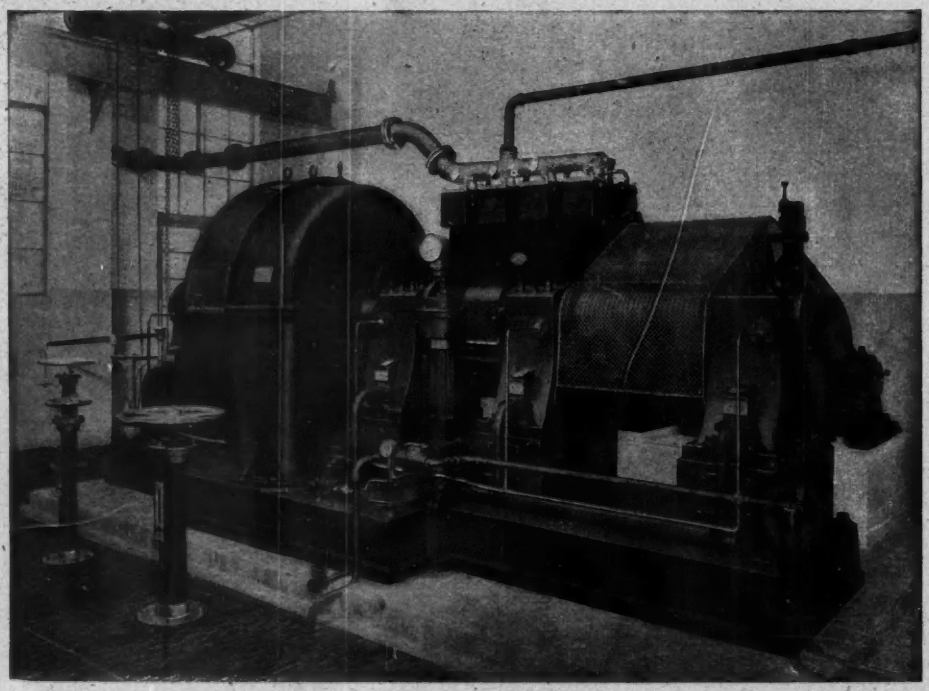

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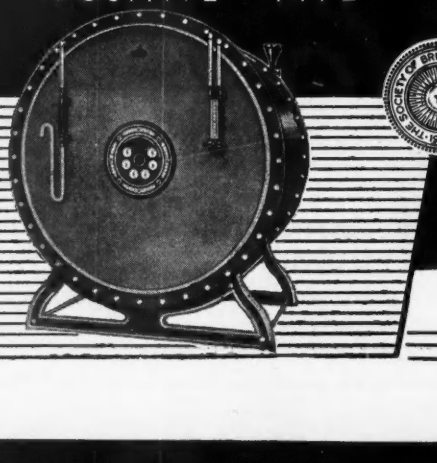

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P.6

GAS JOURNAL, MAY 19, 1943

VOL. 241 95th YEAR No. 4174

EDITORIAL NOTES

A GAS ADVISORY COMMITTEE

ELSEWHERE in this issue appear the names of the strong team of five which the Gas Industry has selected to represent it in "regular and close consultations" with the Ministry of Fuel. As is quite right and proper, the notice issued to us is obviously carefully worded in describing the circumstances leading to the appointment of this Consultative Committee. But, whatever may have been the exact nature of the preliminaries, the Central Executive Board is to be congratulated upon having successfully made representations to the Minister, and the Minister is obviously wise in having stipulated for a Committee of not unwieldy bulk. The selection of it has no doubt given the Industry rather furiously to think, with rather less time than usual in which to make up its mind—and the conditions left it no opportunity of avoiding making up its mind by the old expedient of putting everybody on the Committee and then appointing a whole series of sub-committees. And so we arrive at the selected "experts in the various aspects of the Gas Industry," and, without specifically inviting the attentions of those implacable people who used to heap so much scorn on the official selection committees of peacetime sport, we find it difficult to name any aspect except one which is not represented in the team. Engineering, including in this term constructional and operating experience of "gas grid" supply, administration, accountancy, public and private ownership, the holding company movement, even North of the Tweed and South, all have their representation, and by men who have shown themselves to combine an advanced outlook with ripe experience. So that youth in the Industry, even if no member of the Committee has been selected for tender age alone, should be well served all the same.

It appears, therefore, that the future utility of this machinery of approach to the Ministry will depend largely upon the extent to which the Minister is prepared to make use of it, though, having well received the suggestion, he is evidently prepared to listen to any representations which it may appear expedient to the Committee to make of their own volition. However, from the expression "regular consultations" we are entitled to anticipate something more than happy-go-lucky contacts. The reference to the actual "disbanding" of the Directorate of Gas Supply is the first we have seen made, previous reports, as far as we can trace, having been merely of the resignation of Dr. E. W. Smith and his colleagues. This indication that there is no official intention of continuing machinery of that type is interesting, and gives considerably added importance to such activities as the Consultative Committee can contrive. They will begin their work with the good wishes of the whole industry, which include our own, and it is with no intention of introducing any discordant note that we feel bound to make one comment. We have no inside knowledge as to whether the Society of British Gas Industries was consulted in the matter, but it does appear on the face of it that the Minister is being deprived of the benefit of direct consultation with one most important "aspect" of the Gas Industry. There are a number of quite outstanding men on the plant and appliance manufacturing side who are known and trusted throughout the Industry and who know and understand the Industry in every detail. It might perhaps have complicated the electoral machinery, but, if the Society had agreed to nominate one member of the Committee, we cannot see that any insuperable difficulty need have arisen. But, as we say, we are writing in the dark on this matter, and, for all we know, such a very obvious point may have been thoroughly discussed and settled to everybody's satisfaction long ago.

AN AMBITIOUS PROGRAMME

THE influence of science is greater than it has ever been. We think that the present Government and Parliament attach a value to the help and guidance of scientists that no previous Parliaments have ever done. Symptomatic of this was the formation of the Parliamentary and Scientific Committee, consisting of a small number of members from both Houses, which, through combined membership, linked itself with the organizations representing the great industries, including the Gas Industry, which are based on applied science. The Committee, of which Viscount Samuel is President, has now issued a Report on Coal Utilization Research and the National Economy—the outcome of considerable detailed work in which members of all political Parties, together with representatives of technical and scientific bodies, have actively participated. Copies of the report have been forwarded to the Lord President of the Council and other Ministers, and the Committee is asking the Lord President and the Minister of Fuel and Power to discuss the question of implementation of the recommendations it makes. The programme envisaged is comprehensive and ambitious, and it is urged that several million pounds a year should be expended on research on coal and its utilization in every field. The present expenditure on and volume of research are considered wholly inadequate; "less than 1% of the available scientific man-power of the country is engaged in a problem which is equally vital in peace and in war. . . . A far higher proportion of scientists, engineers, and other technicians should be engaged in coal research." We have no quarrel at all with the idea of more and more research, but we do think that sufficient research has already been carried into practical effect by the Gas Industry to show to an enlightened and determined Government that there is no economic factor to justify the burning of raw coal on the scale it is practised to-day, that the Industry can, right now, furnish smokeless fuels to supplant raw coal without any burden on the consumer's pocket, the while recovering other valuable products from coal which the report stresses again and again are vital to our future national prosperity. No research whatever is needed to justify an enormous expansion of the Gas Industry, however much research may be needed to improve its processes and render them more flexible.

It is all to the good that such lively interest should be displayed in the need for utilizing coal efficiently and deriving from it maximum value in smokeless fuels and in chemicals ; and it is to be hoped that the report of the Parliamentary and Scientific Committee will do more than merely focus attention on the matter for a while, only after a due and decent interval to be filed away together with other " pious sentiment " documents. With the main purport of the report—that we must use coal to better advantage—we are heartily in agreement, but it seems to us that in its detailed reasoning are to be found irreconcilables, a certain airiness concerning a flood of expenditure on research, and a lack of emphasis on the pressing need for taking practical advantage of research which has, so to speak, proved itself. No doubt thoroughly justifiable, it is nevertheless easy to say that "generous grants should be given to encourage fundamental research in all fields which can be expected to yield new theories and new techniques which can help the study of coal." We agree that "the chemical treatment of coal must be attacked with all the resources of pure science and engineering skill"; we agree that coal must to "an increasing extent be regarded as a raw material"; it is pleasant to contemplate the re-examination, if such be necessary, of low-temperature carbonization and the

Fischer-Tropsch process, though "re-examination" hardly seems the right term to apply to complete gasification under pressure. We say this not in a "quibbling" spirit, but because the report does not in our view point as directly as it could to the fact that burning raw coal at the rate we are doing now is a silly policy.

Under the chairmanship of the present Viscount Samuel, the Royal Commission on the Coal Industry reported in 1925 that "the burning of coal in its raw state not only prevents the recovery of any of the derivatives that could be obtained by suitable pre-treatment, but leads to the pollution of the atmosphere by the discharge of products of combustion, a result detrimental in many ways to the public interest." The report of the Parliamentary and Scientific Committee states that the seriousness of the problem is not open to dispute, yet states almost in the same breath that "on the domestic side we want to see the smoke reducing coal fire." This may to some degree be a palliative to the smoke nuisance, but what about the recovery of valuable derivatives? And why, with smokeless fuel which could economically be made available, burn raw coal? Again, at the beginning of the report we have this: "We are fortunate in possessing very large reserves of every type of coal—sufficient to enable us to have very substantial quantities for export," followed by this: "Despite the vast resources of coal which we possess, some of our finest coal measures are nearly worked out." And what are our vast resources? They are, we think, less than 3% of world resources. Obviously if we export "very substantial quantities" of raw coal we automatically deprive ourselves of the products which the Committee unhesitatingly says we must recover if we are to enjoy a sound national economy, adding that every branch of chemical industry in Great Britain is entitled to look to coal to supply its raw material and intermediates. Either we want smoke, or we do not want it; either we want maximum recovery of by-products, or we are satisfied with compromise. It is this spirit of compromise which disappoints us in the report.

After which little criticism, we should add that the activities of the Gas Industry do come in for honourable mention, special reference being made to the Gas Research Board. The coal, gas, and electrical industries, it is urged, should be called forthwith to submit proposals for the rapid expansion of all the various research organizations. "Such schemes," it is stated, "should be generously subsidized by the Government." We would repeat our feeling that prior to an avalanche of taxpayers' money in research on a colossal scale, there should be determination as to what extent it is nationally desirable to burn raw coal, and waste thereby the chemical products which we are told the nation will need more than ever after the war.

FUEL EFFICIENCY

WE attended last week a two-day conference on the utilization of steam, heat, and power arranged by the Fuel Efficiency Committee of the Ministry of Fuel and Power. The conference, held in London, was opened by Major Lloyd George, and attended by a very large number of industrialists and fuel experts. Progress reports covering a wide range of industries were presented. Since the initiation of the all-embracing fuel economy scheme by the Ministry there have been countrywide drive and energy to very great purpose. This was demonstrated beyond any doubt at the conference. It was equally clearly shown that much remains to be done in many directions, for as yet the fields of fuel usage have only been partially investigated. For example, the efforts of the Regions into which the country was divided for the purpose when the scheme was organized have resulted in a rate of saving approximating to 1,000,000 tons of coal a year. That is the result of work since the autumn of last year, and during this time the Regions have been able to inspect only about 17% of all industrial works in the country. The scope for increased saving is apparent. And it was emphasized by several who took part in the conference that increased efficiency in the use of fuel tightens up the efficiency of industrial processes as a whole. The effect of adequate supervision and the exercise of what, after all, is in many instances just common sense cannot, in brief, be evaluated precisely in relation to the amount of coal, coke, gas, oil, or electricity prevented from going to waste. Regarding future scope, economy in large-scale industries lies in small savings spread over a large tonnage, while in small-scale industries it lies in large savings—*i.e.*, large individual savings on a percentage basis—spread over a smaller tonnage.

The numerous ways in which the Gas Industry has given its full support and linked itself to the Ministry's scheme are well enough known within the Industry. How the Industry has organized itself during the past six months or so to afford continuity of gas supply, the demand for which ever increases, to essential war industries is also common knowledge to our readers. It was fitting, however, that early in the conference last week, the President of The Institution of Gas Engineers, Mr. E. V. Evans, should describe briefly the setting-up of Gas Engineering Advisory Boards in the Civil Defence Regions on the basis of mutual aid. Outside the Industry and, we think we are right in saying, even among the Government departments immediately concerned with its work, there was, through lack of knowledge, lack of appreciation of the simple fact that gas-making plant worked continuously at maximum output needs renewal and repair and maintenance. Even to-day we are not satisfied that this fact is adequately appreciated. The matter was put in a nutshell by Mr. Evans in his usual clear style. In normal times the seasonal variation in the demand for gas enabled gas undertakings periodically to overhaul and tune up their gas-making plant. Since the outbreak of war the requirements of war factories have, of course, greatly increased demands for gas from gas-works not originally designed for such outputs. These loads have little or no seasonal variation. Overhaul of plant has been either difficult or impossible. In some instances there has inevitably been gradual deterioration of gas-making plant, accompanied by falling off in this efficiency. In some cases, indeed, this has led to the danger of serious breakdown. Through the mutual-aid scheme, through the internal organization of the Industry working on its own initiative, several cases of threatened breakdown have been averted. The Minister of Fuel and Power has, in fact, expressed his appreciation of this work, but we think it well that any hazy notion on the part of a Government department that gas-making plant can work continuously at maximum output year in year out should be dispelled. In essence, and in war circumstances of the type mentioned, continuity of gas supply depends on the continuous supply of new plant.

There is one other thought, among several impressions we gained at the conference, to which we would refer. Mr. J. G. Bennett (Director of B.C.U.R.A.), in his capacity of Chairman of the Trade Association Sub-Committee, said that in large-scale industries the coal consumption per £1,000 value of output varies from 6 to 100 tons, while in small-scale industries the figures are from 1 to 17 tons ; and he added that it must be clear that if in an industry the cost of coal represents 5 to 10% of the works cost of the finished product, fuel efficiency is an important consideration, whereas when fuel costs are less than 1%, fuel efficiency in normal times cannot be a main preoccupation of the management. To our mind this view is mistaken. We think that fuel efficiency—irrespective of the amount of fuel consumed per unit of product—should always be a consideration of importance to the management. And in our term "fuel efficiency" we do not imply merely thermal efficiency. We have good reason for suggesting that the Ministry of Fuel and Power's fuel efficiency scheme is, by concentrating, perhaps for the first time, the attention of managements of industrial concerns on the use of fuel to the best advantage, proving an eye-opener to managements on this questions of efficiency. It is making them think very hard about the relation between fuel cost and the cost of the finished product. It is making them realize that a fuel of relatively high first cost, heat unit for heat unit, may, in terms of final product, prove considerably cheaper than a cruder fuel of initially low cost. It is making them appreciate

what efficiency means in the use of a fuel which can be controlled easily and which minimizes labour. In many industrial areas in the country appreciation of industrial gas is in point of fact overwhelming.

Letters to the Editor

Temperature and Luminous Flames

DEAR SIR,—The reference in the April issue of the "GAS SALESMAN" to misconceptions regarding luminous flames reminds me of a statement in a modern text-book on the *Theory of Industrial Heating* that "when gas burns in a luminous flame the necessary mixing with air takes place by diffusion of the latter into the body of the flame, so that the combustion process is normally slow, giving a long flame at a relatively low temperature." Now as long ago as 1895 Professor Smithells pointed out in a Paper on "Temperature of Luminous Hydrocarbon Flames," "the vagueness of the term and the impossibility of obtaining any correct measurement of the temperature of the thin shell of glowing gases of which they are composed," and in a Lecture to The Institution of Gas Engineers in 1905 on the "Temperature of Flames" he asked, "What are we to understand when we speak of the temperatures of flames? If we speak of the temperature of a current of warm air, we usually think of a uniform condition prevailing throughout the stream; and we should measure the temperature and understand it in the same way as if we were measuring the temperature of a stream of water. But as a flame consists usually of thin shells of combustion, it is obvious that the distribution of temperature throughout the whole volume of the flame must be very different from that in a current of uniformly heated air. In the middle of a flame we may have a temperature not very greatly above that of the surrounding air; at the edge of the flame, a quarter-of-an-inch away, we may have a temperature above the melting-point of platinum. Again, if we consider a flame from bottom to top, we have no reason to expect that the temperature will be uniform. To thrust any instrument like an ordinary glass thermometer into a flame would, obviously, be absurd; for only a very small fraction of the bulb might be in the hottest part of the flame, and the temperature we should measure would give us no sort of idea of the thermal effects we could really obtain (say) on a Welsbach mantle. The temperature of a flame, as a matter of fact, is usually taken to mean either the temperature of the burning parts, or, if no further qualification is made, it means the highest temperature which can be found anywhere in the flame. But, as I have before insisted, it is extremely important that when the expression 'the temperature of a flame' is used, there should be an exact specification of what is meant, a clear indication of what part of the flame is referred to, and a description of the method by which the measurement has been made." Thus Professor Smithells sought to clarify confused thinking on the subject of flame temperatures.

The fact that low pressure "neat gas" fired natural draught muffle furnaces are in use, the temperature of the working space being as high as 1200° C., is evidence that the temperature of the flame is much above that figure, and there is no reason why higher temperatures should not be attained. In Professor Smithells' 1895 Paper to the Chemical Society, he stated that it was possible to melt platinum wire in the mantle of the flame from a Bray No. 4 union jet burner. He concluded that "the temperature of the mantle of the luminous coal gas flame is above the melting-point, 1750° C., of platinum."

The fallacy that neat gas flames—*i.e.*, gas not mixed with air prior to combustion—cannot as easily and as completely be burnt as air-gas mixtures of bunsen burners is, I think, demonstrated by the millions of neat gas jets used in many different types of gas apparatus, the combustion performance of which conforms to the B.S.I. Specification No. 717, "Combustion Testing of Domestic Appliances." But, the point to be noted is that for most domestic purposes for which gas is used the factor of primary importance is not the temperature of the flame, but the efficient use of a given B.Th.U. input required for any specific purpose.

South Metropolitan Gas Company, Yours faithfully,
709, Old Kent Road, S.E. 15. DEAN CHANDLER.
May 12, 1943.

Luminous and Bunsen Flames

DEAR SIR,—In view of the number of articles which have appeared recently on the merits or demerits of aerated *versus* non-aerated burners, most of which have dwelt at some length on the susceptibility to light-back, lack of foolproofness, and general need of adjustment and attention required by the average aerated burner, I think it may be of some interest to know that there is in existence a modified bunsen burner, designed by myself and partner, which definitely has these properties:

(1) It is impossible to make it light back at the gas orifice, no matter what the speed of flow of the mixture may be, even though a naked light be applied at the air inlets. Variations in pressure do not affect this result, nor do variations in calorific value as far as we have been able to test up to the present.

(2) It attains an air/gas ratio far in excess of the ordinary bunsen burner up to and, if desired, well beyond that theoretically required for complete combustion. This has been confirmed by laboratory tests. The air/gas ratio is readily adjustable by screwing the mixing tube up or down, this being the only movable part in the burner.

(3) The air/gas ratio varies automatically with the pressure and volume of gas passing through the orifice, being greatest at full throttle—yet the burner can be turned down to a tiny pilot light (when the flame will be luminous) with the utmost safety, as it will still be found impossible to light it at the gas orifice. This gives 100% flexibility and stability.

(4) As the length of flame varies only slightly over a fairly wide range of turn-down, the optimum distance between burner and object to be heated can be maintained much more effectively than usual, so increasing overall efficiency.

(5) Construction is such that all air is automatically entrained through fixed ports, no control ring or other device subject to maladjustment being necessary.

This burner is simple, cheap, and foolproof and, while helping to remove most of the drawbacks associated with the normal aerated burner, is free from the limitations imposed by the use of the luminous burner—*e.g.*, avoidance of flame contact with cold surfaces; prevention of flame chilling, &c.

While on this subject I would like to draw attention to a passage which I quote from "A compilation and digest on this Company's suggestions for the Gas Industry's post-war planning" issued by the Brooklyn Gas Company, and recently printed in this country, which reads:

"Top Burners.

"(1) Make top burners heat faster and thereby magnify the only real advantage that we now have over the electric range."

It seems to me that our American friends have here touched upon an important point which it would be well not to overlook when considering the use of luminous burners which, in most circumstances, are not so speedy as the aerated type which transfer heat by direct flame contact.

14, *Queen Anne's Grove*, Yours faithfully,
Ealing, *W.* 5. A. H. GREAVES.
May 14, 1943.

Where Do We Stand?

DEAR SIR,—I have read with the keenest interest "Futurist's" article on future policy within the Industry. May I venture to add a suggestion, bearing upon his ideas for training suitable personnel?

At present there is a very limited chance of small works juniors being selected for posts on large works, and large works people show little desire to apply for posts on smaller undertakings, probably because the salaries are not comparable. And how often the phrase, "experience on an undertaking of similar size desirable," appears in advertisements. As a result, small and medium works juniors after bigger responsibilities are forced to work their way upwards in small steps—if they can—and the process necessarily takes years. One cannot entirely blame managements for refusing to take what they must regard as risks, but the net result is that almost all of those who, by "Futurist's" definition, are receiving adequate training by reason of holding works managerships on works of 4 mil. cu.ft. per day, are "large works" men. It is in despair lest we "small" people (I am senior assistant to an undertaking of 200 mil. cu.ft. per annum) can never stake our claim to the bigger jobs that I offer this suggestion.

Will some influential person or body, such as the Institution's Education Committee, sponsor a Bureau of Exchange, whereby a large works specialist may change places with a jack-of-all-trades small engineer, to their mutual advantage—and so on.

Obviously employers must be safeguarded against acquiring undesirables in this way, and there may be occasional salary adjustments necessary, but the difficulties are surmountable, given good will on all sides.

With all respect to "Futurist" and the other writers who have, of late, stressed the importance of proper training, it is high time that some of the excellent ideas proposed were put into practice, to make us, the present juniors, better fitted for the post-war Industry. The flame of enthusiasm burns brightly in most of us, despite the very economical use of fuel. Yours faithfully,

"BARKAS."

DEAR SIR,—Accepting the suggestion by "Futurist" in your issue of May 5, I should like to occupy the proffered chair at your "round table." As an outside close observer of the achievements and progress of the great Industry for 32 years, may I be allowed to say that there can be no doubt that its vitally important charter of 1920, whereby it was laid down by Act of Parliament that gas was to be charged for according to its heat value, marked a turning-point in its career. I call attention to this as the public are now shown clearly in their accounts what they are buying. This leads me to ask when the therm meter is to be applied in every place using gas. There exists, I believe, such a meter designed by the late Dr. Charles Carpenter. Such a meter would give the public still greater confidence in gas accountancy.

Turning to the question of co-partnership, I fail to see why "Futurist" dismisses the system with such emphasis. I question his statement that the system has been rejected as a failure by nearly all industries; and I consider that its advocates should be given the opportunity of proving its successful operation or otherwise. As an

incentive to the avoidance of waste and to the practice of economy on the works and in the district, can there be any doubt of its great value in the Gas Industry?

The Juniors of the profession should certainly receive every encouragement, of course, and should have in view eventually salaries commensurate with the cost of their training and the acquisition of the experience needed to equip them for the occupation of posts, of which there may be many in the future if our post-war arrangements are drawn up in a statesmanlike manner.

72, *Elphinstone Road*, Yours faithfully,
Hastings, Sussex. WALTER T. DUNN.
May 13, 1943.

Ministry of Fuel and Power

On the disbanding of the Directorate of Gas Supply at the Ministry of Fuel and Power, the Central Executive Board of the National Gas Council suggested that representations should be made to the Minister with regard to regular and close consultations between the Gas Industry and the Ministry.

This proposal was well received by the Minister, who suggested that an Advisory Committee consisting of not more than five persons should be set up, who would be experts in the various aspects of the Gas Industry, and able to advise on any question of importance in connexion with matters arising from the Ministry's relations with the Gas Industry, and also with matters concerning future policy.

When the question arose of nominating the five representatives to form this Advisory Committee, the Central Executive Board felt that the matter was of such importance that a ballot should be taken in each District of the Council. The Board then proceeded to select a number of candidates, and this list was sent to the Management Committees in each District, with the result that the following representatives were duly elected on the aggregate of votes being taken:

Colonel W. Moncrieff Carr, O.B.E., T.D., Managing Director, United Kingdom Gas Corporation, Ltd., Member of the Association of Gas Corporations; Regional Gas Engineering Adviser, North Midland Region.

E. V. Evans, O.B.E., F.I.C., Director and General Manager, South Metropolitan Gas Company, President of The Institution of Gas Engineers, Chairman of the Gas Research Board.

Jas. Jamieson, F.R.S.E., Engineer and Manager, Edinburgh Corporation Gas Department, Chairman of the Scottish Board of the Council; Vice-President of The Institution of Gas Engineers; Regional Gas Engineering Adviser, Scotland.

A. W. Smith, F.C.I.S., General Manager and Secretary, Birmingham Corporation Gas Department; a Vice-Chairman of the Council of the Conjoint Conference of Public Utility Associations.

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At the first meeting of the Committee Mr. E. V. Evans was unanimously appointed Chairman of the Committee and Mr. W. J. Smith was appointed Secretary.

Gas and Electricity Competition

In the course of an Address to the Fuel Luncheon Club on May 13 —Sir David Milne-Watson presiding—Major G. Lloyd George, Minister of Fuel and Power, said: When I recently addressed the British Electrical Development Association I was bold enough to say that I looked for some co-operation, after the war, between the gas and electricity industries. Accustomed as I am to have most of my speeches received in silence, that surpassed anything I had come across in 20 years of public life. Indeed, I can only describe it in the words of the poet who said, "There was silence still as death, and the boldest held his breath"—but that was only for a time, and until I had gone out. (Laughter.) Then, I understand, they had quite a lot to say about it! I regret to say that I propose to return to that theme to-day, but I am comforted by the fact that I am addressing an audience of people who are accustomed to regard fuel matters in their broader aspects. This is a forum where people with varied fuel problems foregather. They hear each other's views and they depart in, I hope, a very thoughtful frame of mind, but it is comforting and encouraging to me as Minister of Fuel and Power that there is a forum of this kind in existence, which will be of immense help to me in the very difficult post-war task that confronts either myself or a successor, and that is making the most efficient use of the fuel resources of this country.

What did I mean by co-operation? I do not think anyone will disagree with me if I say that no industry can survive, at any rate economically, unless it realizes that its main duty is to its customers. It is the customers an industry must bear in mind in thinking out its future programme. The difficulty is to merge the interests of the customers into those of the nation at large. May I give you an example which I quoted at the meeting I have just referred to? I said that where it was available every customer should be entitled to have a choice of gas or electricity or other fuel—where it was available. But, of course, it is obvious that cases will arise such as in very rural districts where that would not be possible without either putting a charge over the whole or putting an exceptionally heavy charge on the individual or the locality. That is a small example. Let me give you another one. Everybody in this country accepts the fact that gas and electricity are vital to this country's prosperity. For instance, we could not contemplate losing the by-products of the Gas Industry. Equally, we could not contemplate losing the convenience of electric light. These are two extremes about which there is general agreement. There is no controversy about that, but in between these two extremes there lies a field in which the importance of these two industries varies, and it is up to us to see that the benefits they confer are not prejudiced in cost or in extent by a struggle for mastery in that intermediate zone.

Take publicity. After the experience I have had during the past twelve months I am the last person to offer criticism of publicity, but there is publicity *and* publicity. Educational publicity, of course, is of immense importance in any development, but there is another publicity which we have seen in the past which is evidence of the internecine strife between the two industries which costs a good deal of money, and it is not paid for either by the gas or the electricity industries. It is the man who uses the products of these two industries who, in the end, as in everything else, has to pay for it.

I appreciate the attitude of the electricity industry, for example, to the post-war period. I appreciate that it is looking forward with eagerness to that period. It is a young industry and an expanding industry and, not unnaturally, it is anxious to escape from the bonds put upon it by fuel economy. Let me say in passing—I have said it before, but I want to repeat it—how much I appreciate the loyal co-operation which I have received in the campaign for fuel economy, particularly during the last 12 months. I do appreciate what it means to people who have been spending large sums of money to get people to use more when they willingly contribute sums to get people to use less, and I want to express my appreciation of the loyal co-operation I have received in that respect. But is is only natural that the electricity industry should be anxious to proceed with its post-war development.

There will be much house-building after the war, and I hope it will be on the basis of giving people inside those houses the very latest and most complete equipment that it is possible to give them. It is not unnatural that the electricity industry should be looking forward eagerly to playing its part there. So, also, is the Gas Industry. It has played and is playing a vital part in the war effort, and its industrial load has very greatly developed. It, also, has had very severe restrictions put upon its domestic load; it also has contributed in full measure to the fuel economy campaign. But the Gas Industry is a much older industry, and cannot hope for the rapid and marked progress which characterized the electricity industry since 1920. Nevertheless, with its valuable carbonization processes it is essential to the nation; and we must not forget these factors when the time comes to weigh these problems up.

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Mr. Tunmore continued: "As regards methods of charge, I think it will be difficult to prove which method is most suitable for the whole of the country—flat rate, two-part tariff, or block rate. My Company still works on the flat rate, with a varying scale of discounts where gas is used for power or central heating according to the quantity consumed, and with the few large industrial consumers under special contract prices. We consider this method most suitable in our area, where the majority of our consumption is domestic. In other parts of the country certain undertakings have huge industrial loads and a different method is no doubt better.

"Regarding standardization of gas appliances, especially cooking apparatus, it will be agreed that there are far too many varying sizes and types of domestic cooker in use to-day, and with the rapid extension of hire-purchase for several years up to 1939 undertakings were compelled to carry a large and very varied stock of replacement parts, to enable them to be in a position to replace worn-out parts of a dozen or more different types and sizes of cooker which had been purchased by consumers under these terms.

"In my opinion, one of the things which is most neglected in the Industry is service policy. In many undertakings a consumer's

apparatus is practically forgotten once it has been purchased, and in numerous cases no attention is given to the size of service pipe or meter at the time of installation to see if they are adequate to carry the extra load.

"When we return to more normal conditions one of the first matters to be considered will no doubt be some form of regional control, or amalgamation of several adjoining undertakings, or, as has been suggested in some quarters, nationalization or Government control of all public utility undertakings. If the amalgamation policy is adopted I presume we shall have more holding companies operating in various parts of the country, and in connexion with this policy I should like to voice an opinion. It appears to me that when several undertakings are grouped under a holding company, the engineer in charge of each of the grouped undertakings must sooner or later lose a certain amount of interest in the works where he has once held absolute control, but which he has had to relinquish to the chief engineer of the holding company. It should be possible to improve organization within the Industry without grouping to any great extent. Again, will regional grouping of undertakings induce the right type of student to enter the Industry, or will it have the opposite effect? I suppose every youth who takes up gas engineering seriously hopes to become a fully qualified engineer, with a gas-works under his own control, and to be answerable only to either a board of directors or a public authority. With the grouping of undertakings his hopes of ever attaining that position will have been considerably diminished. Then as regards the salaries of many assistant and other technical members of staffs, one sees from time to time Press advertisements under the heading of 'Appointments Vacant' where the salary offered is totally inadequate when compared with the knowledge and training required by applicants. This is a matter which requires remedying without delay, and could easily be overcome by having a scale of salaries according to the size of the undertaking.

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Mr. **E. Crowther** (Newcastle), proposing a vote of thanks to Mr. Evans, said they would welcome the information Mr. Evans had given them on post-war planning in a way that no earlier communication on the subject had done. They sometimes heard critical remarks of what was considered to be the excessive influence of London in the Gas Industry, but they would all agree that as long as London produced such men as Mr. Evans, they would welcome that influence. The proposals for a central council to speak for the Industry involved, as Mr. Evans had made abundantly clear, a tremendous amount of work, some of which had been completed and much of which was being attended to. This work, however, could not come to fruition without the approval by the Industry of those findings recommended for inclusion in legislation to apply to the Industry. Given a successful conclusion to such proposals, he thought they could look forward to an expansion in the Industry on a scale hitherto unknown. Given the stimulus of unity of ideas and service then they might well be surprised by the degree in which the potentialities of the Industry would unfold themselves in the future. The attainment of the highest standard of service by the Industry was not possible, he suggested, as it was at present constituted. The Industry comprised a large number of separate undertakings, many of them too small to have the advantage of ample capital and commercial and specialized staff which, he thought, would be necessary in the future to render to the public the highest service. It was for such reasons that he believed that integration was the only alternative before them, perhaps, to nationalization. He did not think that small undertakings were the only opponents of integration. Opposition was sometimes apparent from larger undertakings, who seemed to view the situation from selfish considerations and with indifference to their neighbours. There lay a more dangerous tendency in such an attitude, he suggested, than in the fear of small undertakings being absorbed. He thought it might be well if the opponents of integration took heed while there was still opportunity.

Mr. **T. Hornsby,** Durham Regional Fuel Controller, called on by the President, congratulated the Gas Industry and particularly the executives in the North of England area on the manner in which, since the beginning of the war, they had maintained the tradition of the "show must go on" despite their many difficulties. He thought the Industry was wise to take time by the forelock, and was showing foresight in considering what was going to be its position after the war. Throughout his business career he had had a good deal to do with gas. One of his more memorable associations was when, as a railway official and general manager at York Station, he had to decide on the lighting for the station, and he had eventually decided on gas, which he thought was a wise decision and he had never regretted making it.

Election of Officers

The following officers were elected for the ensuing year :

President—J. W. Pallister.

Vice-President—H. Douglas Lees (who was also re-elected Hon. Secretary and Treasurer).

Committee—W. Sutcliffe (Blyth), C. C. Walmsley (Sunderland), J. E. White (Newcastle).

Hon. Auditor—A. S. Middleton (Durham).

District Education Committee—A. E. Ruffhead (Darlington), E. Crowther (Newcastle), R. H. Duxbury (South Bank), and J. M. A. Mitchell (Newcastle).

Mr. Pallister was elected a member of the Educational Advisory Committee.

The retiring President, Mr. W. Tunmore, was presented with a certificate by Mr. Pallister on behalf of the members, to commemorate his year of office.

A vote of thanks to the officers of the Association for their work during the past year was proposed by Mr. **W. Sutcliffe.**

Institution of Gas Engineers

The last two meetings of the Council of The Institution of Gas Engineers were held on April 16 and May 11, the former at the Queen's Hotel, Leeds, and the latter in London. Prior to the meeting in Leeds, members of Council inspected, by arrangement with Prof. D. T. A. Townend, the work in progress in the Gas Research Laboratories of the Fuel Department at Leeds University.

The following were among the matters dealt with at the two meetings:

Reports were made of recent meetings of the Gas Installations Committee, the Meters Committee, and the Liquor Effluents and Ammonia Committee, and a memorandum prepared by the Pipes Committee entitled "Removal of Debris from Damaged Gas Mains," dated March 18, 1943, was approved for circulation to gas undertakings with an annual make of 500 million cu.ft. and over.

Approval was given, in principle, for the introduction in the post-war period of a Preliminary and Associate Membership Examination, a revised Diploma Examination, and a Gas Technology Examination.

National Gas Council

A Meeting of the Central Executive Board of the National Gas Council was held on May 11 at Gas Industry House. Mr. Frank H. Jones, M.Inst.C.E., M.I.Mech.E., J.P., Vice-Chairman of the Board, presided.

Members of the Board learned with regret of the death of Mr. H. C. Honey, O.B.E., at one time Director of Gas Administration at the Board of Trade, on April 19. It was stated that Mr. Honey had relinquished his position at the Board of Trade in 1926. He had always been an extremely good friend of the Industry, and up to the last his interest had never flagged.

It was agreed that the next meeting of the Board should be held on June 8 at Gas Industry House, at 11.30 a.m., and that the annual meeting should take place at the Institution of Civil Engineers, S.W. 1, at 2.15 p.m., to be followed by the annual meeting of the Federation of Gas Employers at approximately 3.15 p.m.

A report on the general coal position was submitted.

It was reported that the Ministry of Fuel and Power proposed to give considerable publicity to coke, and were desirous that the coke industry should augment such publicity. The Board accepted in principle a proposal made by Colonel H. C. Smith, Chairman of the National Federation of Gas Coke Associations, to deal with this question.

Mr. A. E. Sylvester, Chairman of the Committee appointed by the Board in September last, reported that the Gas Prices Committee had investigated in detail those cases where applications to the Ministry of Fuel and Power to increase the price of gas had been rejected, and the steps which had been taken in an endeavour to rectify the position.

Western Juniors

At the general meeting of the Association on May 1 officers for the ensuing session were elected as follows:

President.—A. Bell (Exeter), to continue in office.

Senr. Vice-President.—A. B. Horsfield (Bristol).

Junr. Vice-President.—A. G. Holtam (Cheltenham).

Hon. Treasurer.—A. B. Horsfield.

Hon. Secretary.—F. W. Sansom (Exeter).

Hon. Auditors.—J. F. Marlow (Weston-super-Mare).
T. N. Dent (Bristol).

Council.—S. Hole (Bath), J. T. Spencer (Weston-super-Mare), T. Clapham (Bristol), A. R. Langford (Plymouth), A. C. Rea (Bath).

Diary

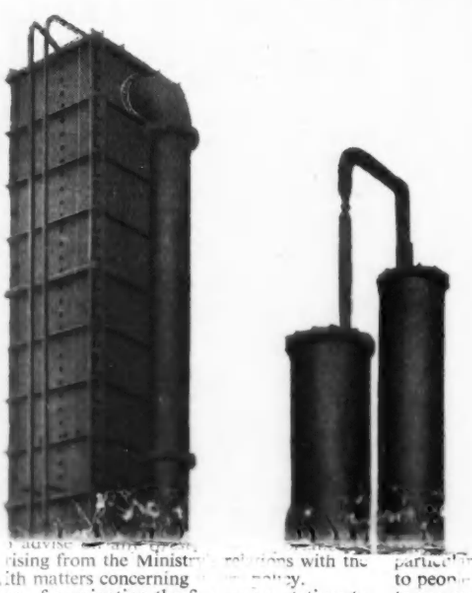
May 26.—B.C.G.A.—Executive Committee, Gas Industry House, 2 p.m.

May 27.—Wales and Monmouthshire Association—Annual Meeting, Cardiff (Park Lane Hotel), 11 a.m.

June 9.—Institution of Gas Engineers, Annual General Meeting, London.

June 9.—National Benzole Association—Annual General Meeting, Wellington House, Buckingham Gate, S.W. 1, 3 p.m.

STANDARDISED BENZOLE RECOVERY PLANT



A complete range of standardised plants is supplied up to a capacity of 1,500,000 cu. ft. of gas per diem.

...rising from the Ministr... relations with the ...ith matters concerning ... policy.

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WHAT OF THE FUTURE IN THE DOMESTIC FIELD?*

By

Dr. HAROLD HARTLEY

DISCUSSION

Lieut.-Colonel **F. J. Bywater** (President of the Southern Association) said Dr. Hartley was very well known to them, and his firm were pioneers in domestic appliances. They were most grateful to him for his thoughtful and valuable Paper. He had in effect said, "Tell us what you want and we will do our best to let you have it." There had been considerable criticism in various quarters as to what the Gas Industry was doing, or ought to be doing, to put its house in order and prepare for the post-war period. On behalf of those who had such matters more in their charge than he had, it should be pointed out that things had not been easy in the last three years. When the war broke out there was on the part of every decent man who could possibly go, an eagerness to get away and do something actively connected with the war, and the staff at Gas Industry House very largely disappeared. Fortunately or otherwise they were allowed to go, and for the first twelve months of the war the organization was more or less moribund. For the following twelve months their attention was devoted to circumstances too well remembered to need recalling, so that at any rate up to 1941 there was little encouragement to consider post-war problems. The leaders of the Industry were not as much at fault as some of the critics would have them believe, because in July, 1941, there was a long discussion in the B.C.G.A. Executive Committee, and it was realized that it would be necessary very shortly to get together to solve their post-war problems. As the result of that discussion the Post-War Planning Committee was set up and it had done most valuable work. They could not expect busy men to get there every week to do the planning with practically no staff there. However, a number of valuable reports had been put forward, and one of the most valuable, the report of the Utilization Sub-Committee of the Post-War Planning Committee, had just been circulated to the districts. Other reports had been put out on standardization of appliances, standardization of calorific values, elimination of sulphur, and so on, and he felt they were now coming to the position, both in the war and in their own affairs, when they could say they were prepared to implement the spade work that had been put in during the last two years.

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Council housing estates consisting of several thousand houses, showed that where there was a flat rate charge for gas there was an average consumption of 114 therms per annum, and where there was a tariff rate there was an average consumption of 195 therms per annum. That was for cooking and water heating alone. In the case of one estate where there was keen electrical competition the flat rate consumption amounted to 131 therms per annum, while the tariff consumption reached 195 therms per annum. His own experience was that a well-constructed tariff, for commercial, industrial, and domestic use, was absolutely essential to the Gas Industry. The only way they could expand was to compete with solid fuel, and unless they could offer gas at a commodity price in the domestic market they would not be able to progress.

An All-Gas Advocate

They must look to the design of the cooker and give more attention to the efficiency of the oven. The hotplate was all right, but the oven certainly wanted looking after. He agreed with Dr. Hartley that there had been great improvements in gas fires, and his own Company had done a lot of work on the same lines. As regards water heating, Dr. Hartley still praised the coke boiler. He (Col. Bywater) was an unrepentant all-gas man, and he hoped he would see the day when, apart from lighting, everything in the house in the way of fuel utilization would be done by gas. One thing really needed in the modern house was an incinerator or destructor. He did not believe in the old sentiment about the flickering flames of the open coal fire. When one had to clean up the dirty grate, as most of them had had to do, one forgot about the dreamy hours spent looking at the flames. When the open fire was quite superseded by the well designed, well constructed gas fire, controllable in its temperature and giving comfort and healthy heat in the room, there would be an even greater need for an incinerator. The cheapest and best he had found so far cost from £6 to £7, and it was not very effective. As regards water heating, he was very much in favour of the instantaneous water heater and the storage heater; the only thing to compete with the instantaneous heater was the coke boiler. The Industry was indebted to Dr. [illegible]man for s[illegible] [illegible] got into making the 'Ascot' heater [illegible] [illegible] were made [illegible]

Committee, the Meters Committee, and the Tunnel Effluents and Ammonia Committee, and a memorandum prepared by the Pipes Committee entitled "Removal of Debris from Damaged Gas Mains," dated March 18, 1943, was approved for circulation to gas undertakings with an annual make of 500 million cu.ft. and over.

Approval was given, in principle, for the introduction in the post-war period of a Preliminary and Associate Membership Examination, a revised Diploma Examination, and a Gas Technology Examination.

National Gas Council

A Meeting of the Central Executive Board of the National Gas Council was held on May 11 at Gas Industry House. Mr. Frank H. Jones, M.Inst.C.E., M.I.Mech.E., J.P., Vice-Chairman of the Board, presided.

Members of the Board learned with regret of the death of Mr. H. C. Honey, O.B.E., at one time Director of Gas Administration at the Board of Trade, on April 19. It was stated that Mr. Honey had relinquished his position at the Board of Trade in 1926. He had always been an extremely good friend of the Industry, and up to the last his interest had never flagged.

It was agreed that the next meeting of the Board should be held on June 8 at Gas Industry House, at 11.30 a.m., and that the annual meeting should take place at the Institution of Civil Engineers, S.W. 1, at 2.15 p.m., to be followed by the annual meeting of the Federation of Gas Employers at approximately 3.15 p.m.

A report on the general coal position was submitted.

It was reported that the Ministry of Fuel and Power proposed to give considerable publicity to coke, and were desirous that the coke industry should augment such publicity. The Board accepted in principle a proposal made by Colonel H. C. Smith, Chairman of the National Federation of Gas Coke Associations, to deal with this question.

Mr. A. E. Sylvester, Chairman of the Committee appointed by the Board in September last, reported that the Gas Prices Committee had investigated in detail those cases where applications to the Ministry of Fuel and Power to increase the price of gas had been rejected, and the steps which had been taken in an endeavour to rectify the position.

Western Juniors

At the general meeting of the Association on May 1 officers for the ensuing session were elected as follows:

President.—A. Bell (Exeter), to continue in office.
Senr. Vice-President.—A. B. Horsfield (Bristol).
Junr. Vice-President.—A. G. Holtam (Cheltenham).
Hon. Treasurer.—A. B. Horsfield.
Hon. Secretary.—F. W. Sansom (Exeter).
Hon. Auditors.—J. F. Marlow (Weston-super-Mare).
T. N. Dent (Bristol).
Council.—S. Hole (Bath), J. T. Spencer (Weston-super-Mare), T. Clapham (Bristol), A. R. Langford (Plymouth), A. C. Rea (Bath).

Diary

May 26.—B.C.G.A.—Executive Committee, Gas Industry House, 2 p.m.

May 27.—Wales and Monmouthshire Association—Annual Meeting, Cardiff (Park Lane Hotel), 11 a.m.

June 9.—Institution of Gas Engineers, Annual General Meeting, London.

June 9.—National Benzole Association—Annual General Meeting, Wellington House, Buckingham Gate, S.W. 1, 3 p.m.

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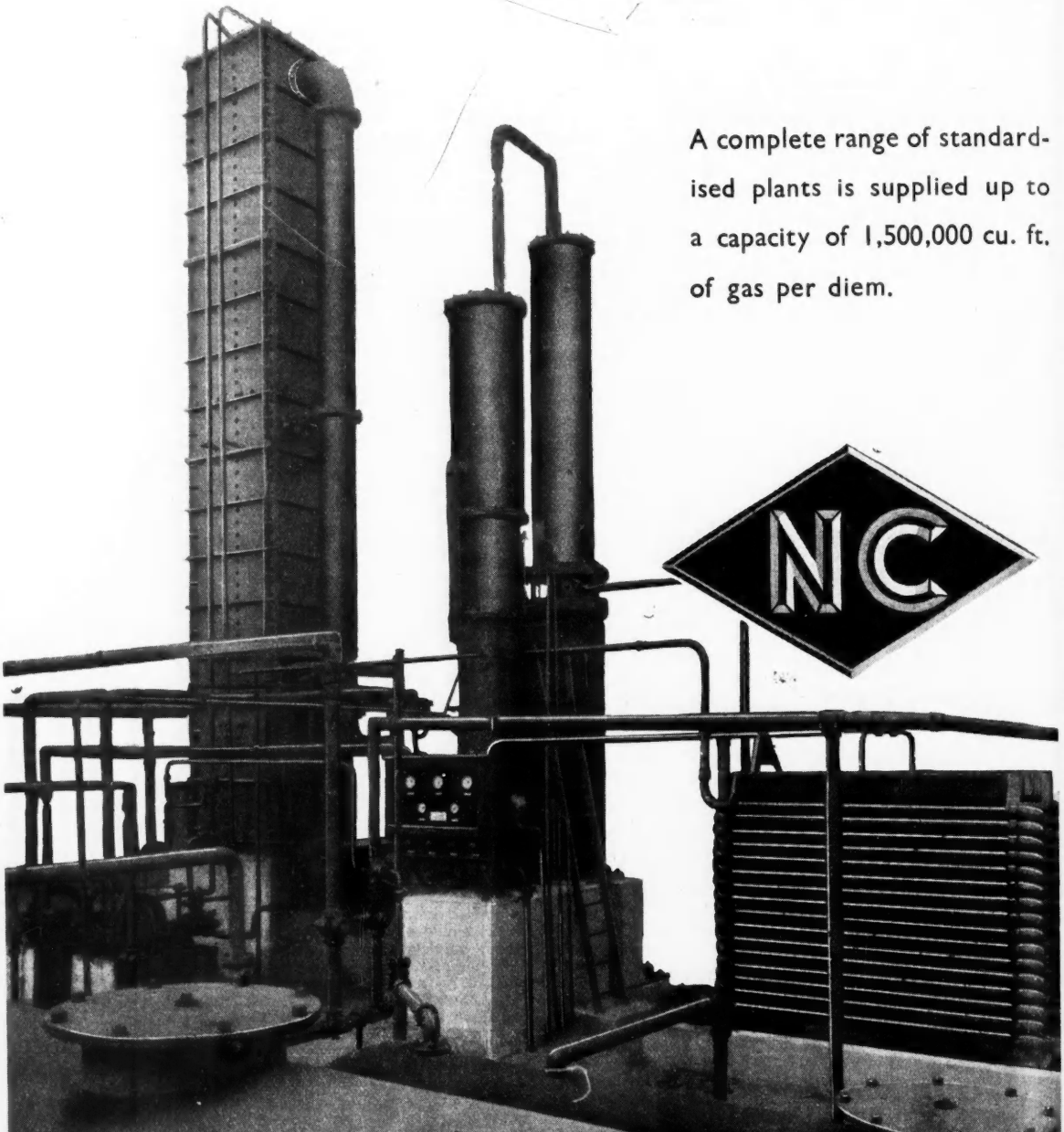

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WHAT OF THE FUTURE IN THE DOMESTIC FIELD?*

By Dr. HAROLD HARTLEY

DISCUSSION

Lieut.-Colonel **F. J. Bywater** (President of the Southern Association) said Dr. Hartley was very well known to them, and his firm were pioneers in domestic appliances. They were most grateful to him for his thoughtful and valuable Paper. He had in effect said, "Tell us what you want and we will do our best to let you have it." There had been considerable criticism in various quarters as to what the Gas Industry was doing, or ought to be doing, to put its house in order and prepare for the post-war period. On behalf of those who had such matters more in their charge than he had, it should be pointed out that things had not been easy in the last three years. When the war broke out there was on the part of every decent man who could possibly go, an eagerness to get away and do something actively connected with the war, and the staff at Gas Industry House very largely disappeared. Fortunately or otherwise they were allowed to go, and for the first twelve months of the war the organization was more or less moribund. For the following twelve months their attention was devoted to circumstances too well remembered to need recalling, so that at any rate up to 1941 there was little encouragement to consider post-war problems. The leaders of the Industry were not as much at fault as some of the critics would have them believe, because in July, 1941, there was a long discussion in the B.C.G.A. Executive Committee, and it was realized that it would be necessary very shortly to get together to solve their post-war problems. As the result of that discussion the Post-War Planning Committee was set up and it had done most valuable work. They could not expect busy men to get there every week to do the planning with practically no staff there. However, a number of valuable reports had been put forward, and one of the most valuable, the report of the Utilization Sub-Committee of the Post-War Planning Committee, had just been circulated to the districts. Other reports had been put out on standardization of appliances, standardization of calorific values, elimination of sulphur, and so on, and he felt they were now coming to the position, both in the war and in their own affairs, when they could say they were prepared to implement the spade work that had been put in during the last two years.

Kitchen Planning

Reference had been made to the extremely able propaganda material being issued by the Electrical Association for Women, and he felt it was time the Gas Industry began to tell the appliance makers and the Post-War Housing Committees what it wanted. It was about to do that, he thought. The B.C.G.A. had appointed a Kitchen Planning Committee in conjunction with Dr. Hartley's own Company, and Mr. J. F. Davies had been instrumental in getting a model kitchen together. The B.C.G.A. had co-operated with Dr. Hartley's firm in the preparation of the model kitchen, to show what could be done. He would go further and say that in each of the National Gas Council's districts they should have a model house on the lines that Dr. Hartley had outlined in order to show the housing authorities what they really meant to suggest. With regard to post-war planning affairs he did not think he was betraying any confidence in saying that it was intended to remodel the national bodies operating from Gas Industry House. It was proposed that the National Gas Council and the B.C.G.A. should amalgamate and appear in future as one body. The proposal was being submitted to the districts, and if it was approved there would be, within the ambit of the one great central authority, a strong Development Board to deal with all matters appertaining to development. He had felt that there had never been a body so constituted as to deal in a properly constitutional way with all matters of development. Papers were read at meetings of The Institution of Gas Engineers, or the B.C.G.A., or at their own Association, where most valuable ideas were put forward, but under present conditions nothing more was heard of them. It was now proposed, and he hoped the proposal would be supported, that there should be established within the central authority this Development Board, on which he hoped the best brains of the Industry would serve, so that it might give direction—not control—and assistance to the districts and to all the undertakings in the districts.

He noticed that Dr. Hartley had suggested that promotional tariffs should not be encouraged. In one of the Post-War Planning Committee's reports it had been stated that apparently there was no information yet available to show whether tariffs were of serious value to the Gas Industry. He very much hoped that before the Committee ceased to function such information would become available, because he could not believe that well-constructed tariffs were not of the greatest importance to the Industry. His own Company tried to put up a model tariff in 1936, but it had disastrous results. It had every reason behind it in the matter of equity, but it was psychologically wrong, and they then turned their attention to a voluntary tariff. Figures taken from the latest returns relating to six London County Council housing estates consisting of several thousand houses, showed that where there was a flat rate charge for gas there was an average consumption of 114 therms per annum, and where there was a tariff rate there was an average consumption of 195 therms per annum. That was for cooking and water heating alone. In the case of one estate where there was keen electrical competition the flat rate consumption amounted to 131 therms per annum, while the tariff consumption reached 195 therms per annum. His own experience was that a well-constructed tariff, for commercial, industrial, and domestic use, was absolutely essential to the Gas Industry. The only way they could expand was to compete with solid fuel, and unless they could offer gas at a commodity price in the domestic market they would not be able to progress.

*An Address to the Southern Association of Gas Engineers and Managers Eastern Section)—published in last week's "JOURNAL," pp. 583 *et seq.*

An All-Gas Advocate

They must look to the design of the cooker and give more attention to the efficiency of the oven. The hotplate was all right, but the oven certainly wanted looking after. He agreed with Dr. Hartley that there had been great improvements in gas fires, and his own Company had done a lot of work on the same lines. As regards water heating, Dr. Hartley still praised the coke boiler. He (Col. Bywater) was an unrepentant all-gas man, and he hoped he would see the day when, apart from lighting, everything in the house in the way of fuel utilization would be done by gas. One thing really needed in the modern house was an incinerator or destructor. He did not believe in the old sentiment about the flickering flames of the open coal fire. When one had to clean up the dirty grate, as most of them had had to do, one forgot about the dreamy hours spent looking at the flames. When the open fire was quite superseded by the well designed, well constructed gas fire, controllable in its temperature and giving comfort and healthy heat in the room, there would be an even greater need for an incinerator. The cheapest and best he had found so far cost from £6 to £7, and it was not very effective. As regards water heating, he was very much in favour of the instantaneous water heater and the storage heater; the only thing to compete with the instantaneous heater was the coke boiler. The Industry was indebted to Dr. Friedman for all the pioneer work he had put into making the "Ascot" heater so efficient; he only wished every heater on the market was as efficient.

Reference had been made to the demands that would be made on behalf of the housewife in the post-war world. War always produced many ideas of what people were going to do afterwards, but after the last war many of those ideas did not come to fruition. One thing they must do after this war was to give the housewife a square deal. If they were to find favour in the post-war world it was essential that they should pay attention to the conditions in which the housewife did her work. They had good appliances, and Dr. Hartley had shown them good reason to be optimistic. They were spending a lot of money on research. Supposing the utmost was obtained from that research they might reduce the price of gas into the holder by a penny per therm. That was an optimistic estimate, and at present he could not see it being done, but it was a possibility now being tried out, and it might be many years before it could be done. But look at the possibilities of reducing the cost of gas to the consumer if they could increase his consumption by anything from 40 to 100%.

Speaking to works engineers, he did not think they paid nearly enough attention to the preparation of coke in the works. They were very much in the hands of the collieries at the present time, and coal output was being pushed at the expense of quality, but it was worth their while to pay very great attention to this question of coke preparation.

Dr. **Hartley** said he was anxious that his reference to promotional tariffs should not be misunderstood, and he re-read the passage concerned. He had used the expression "promotional" tariffs in the sense of implying that they did not want tariffs that were not economical. It was not a practice of which they had been guilty in the past, but other industries had put forward tariffs which they could not possibly extend to the whole of their consumers. If they put forward an uneconomical tariff to secure a certain load they had to penalize one or more of the other loads. He urged that they should have low commodity tariffs, and that they should be economic. With regard to relative costs of gas and electricity, the position, based on present-day appliances, was that in order to compete with gas, the cost of electricity per unit for cooking must not exceed one-twentieth of the cost of gas per therm; thus if gas was sold at 10d. per therm, the charge for electricity must be a halfpenny per unit to compare in cost. On the question of the domestic incinerator, the difficulty was that they had to get rid of a large amount of moisture, and the gas incinerator had not so far been a success. For incinerating purposes the coke boiler was effective. As regards the design of gas fires, he believed the gas fire should have its own individuality, and that it should be characterized by features which are in keeping with the fuel used. There should be no attempt to make it simulate the appearance of some other type of appliance. On the question of

water heating there was now a strong division of opinion as to the type of water heater likely to be most successful. Conditions would vary throughout the country, but the point he would make was that relatively speaking gas was a dearer fuel in prime cost than, say, solid fuel, and they must see that the hot water service was at least as effective as that provided by competing apparatus.

Women's Advice Wanted

Mr. **A. Tennant** (East Surrey) said the title of Dr. Hartley's Paper raised in his mind the necessity of having the co-operation of women at the present time with regard to the future planning of the industry, and also in the future on the commercial side. At present a lot of women were in business or industry and a lot of them had become very highly trained, and personally he did not think they had made sufficient use of them in their own business. They had not had the benefit of their advice so much as the electrical people had. He urged that they should seek the advice of women now, particularly with regard to planning. He would like to ask Dr. Hartley whether he though the standardization of calorific values throughout the country would help them in their post-war activities. Another point with which he was much concerned was the burden of maintenance of appliances on the district. He would suggest to Dr. Hartley that in the design of post-war appliances the question of maintenance should be given very careful consideration. He wondered whether he would care to say a few words with regard to the qualities of luminous burners as compared with the bunsen flame. He hoped the cost of appliances after the war would not be a stumbling-block, and he wondered whether the purchase tax was likely to be continued, and what effect that would have on the commercial development of their business. He hoped that the uneconomic competition between gas and electricity would not continue after the war.

Colonel **Bywater,** referring to Mr. Tennant's remarks about women, pointed out that there was to be a women's section in the proposed new Development Board about which he had spoken.

Dr. **Hartley** said it was perhaps not realized that the gas appliance manufacturer did in fact discuss with the women members of his staff the design of appliances in which they were particularly interested. His company also made it a practice to see that new apparatus was well tried out before it was offered to the gas undertakings. That involved testing the appliances in homes up and down the country, and in that way they also got the views of the womenfolk. He was interested recently, in discussing certain new ideas for a gas cooker with his own wife, to find there was only one thing in her mind that mattered. She was not concerned with efficiencies or consumption, but wholly with the idea of making cleaning easier. Mr. Tennant had spoken of maintenance from the undertaking's point of view. Maintenance from the housewife's viewpoint meant cleaning. They regarded maintenance as one of the most important points in connexion with new appliances, and they realized that if there was to be a greatly extended use of gas-consuming apparatus it must not involve gas undertakings in engaging a large staff to see that it was kept in working order. In the last thirty years appliances had become more efficient, and in certain cases that had possibly involved increased maintenance. It was that factor of maintenance in connexion with the gas fire that led them to give serious thought to the possibility of applying the luminous flame. They had found that by using a luminous flame the maintenance of the fire could be very considerably reduced, and there were, in fact, fires that had been in operation throughout the war without any attention at all.

Fashion and Sales Appeal

There were fashions in design, and there was always a great temptation to produce some sort of change so as to create a new fashion. Many people thought the extension of the use of the luminous flame would have a great sales appeal, and the public would be persuaded that it represented a great advance. There were certain advantages that accrued, just as there were with the fixed orifice injector. In the gas fire the luminous burner had obviated troubles due to the choking up of the eddy filters with fluff in bedrooms and elsewhere. With regard to the post-war cost of apparatus one did not know what would be the basic price of commodities after the war, but he did not think there would be any great increase in the cost of gas appliances compared with the appliances that would be offered by competing industries. He anticipated that solid fuel appliances would tend to show a greater increase than those using gas, and that the increase in the cost of electrical appliances would be about equal to those of gas appliances. Uneconomic competition must be eliminated as far as possible. It might be argued that all competition was uneconomical, but he hoped there would still be some competition. He was an individualist and he believed in competition.

Mr. **J. H. Dyde** (Uxbridge) said he had always been an enthusiast for the use of coke, with its high efficiency combined with low thermal cost. Were it not for the fact that many of them had good coke markets they would not be able to sell gas at its present price, and if they went on gasifying coke their price of gas must go up. Colonel Bywater had given some most interesting figures showing the increased number of therms consumed under a promotional tariff, but he felt they must await the results of the development work of Dr. Dent and others, involving changes in their present manufacturing resources, before they could look to the day when gas could completely displace solid fuel. In the meantime it was in their interests to go through the intermediate stage of pushing the consumption of 40 million tons of coal out of the way by the use, primarily, of coke. If they went for that coke market they would not have any difficulty in disposing of the gas which would, under present circumstances, result from its manufacture. He could speak from personal experience about electric cooking, because when he moved some time ago from one district to another the only house he could get was "all electric." He could not imagine how anyone could possibly use an electric cooker if they had had any experience of the use of a modern gas cooker. He had seen a fireplace set in the corner of a lounge, in a somewhat similar position to that indicated in one of Dr. Hartley's modern house illustrations. It was not satisfactory in actual practice, and the ladies did not think so because they could only gather round the fire in an arc of 90°. He felt the right place for the fire was midway along the wall, where it had been for years. On the question of coke production, he felt it was appalling that the Gas Industry nowadays should have the handicap of the ash and the very bad quality of the coal they were receiving. It was having a disastrous effect on their present and potential consumers, and he hoped something could be done to improve the position in that respect.

A Change of Name

Mr. **P. E. Browne** (Brighton) commented on Mr. Tennant's fear as to maintenance costs, and said they did not want appliances so complicated that their maintenance people had difficulty in servicing them. He was confirmed in his opinion that regular inspection and maintenance of appliances by the undertaking, in the consumers' houses, worked to the very great advantage of both parties. He saw no difficulty in providing for the cost of the work. For example, in the case of hire purchase spread over a fair number of years, up to five, the terms were so arranged as to cover the cost of the service. A few years ago they had a fairly large staff on what they called the "complaints section" (a very bad name from the point of view of the Gas Industry). They renamed it the "supply service department," and the change of name conveyed a different impression to the mind of the consumer. They removed the idea of complaints and established instead the principle of regular contact with the consumer on the service side. He was a great believer in the service that a gas undertaking could render to the consumer; that service was far more important than the original installation of a gas-burning appliance, which was often forgotten. Price of gas per therm was not so important as the service that was given. Twenty years ago his company undertook universal maintenance. It cost about one-fifth of a penny per therm to give quarterly visits to every appliance known to the undertaking in its area of supply. It was manifestly impossible to continue that system during wartime, and so a charge was now made except in the case of hire-purchase appliances, which were already priced to allow for maintenance. Some very good work was being done and there were no complaints. Mr. Dyde had taken some exception to what Colonel Bywater had said about the possibilities of promotional tariffs. Here again, his company had been in the field before the war with a promotional tariff. They called it a half-price tariff, half the price being charged as a commodity charge and the other as overhead, the whole of the gas burnt being charged at half price. He could confirm what Colonel Bywater had said, that such a tariff was very promotional indeed. Unfortunately they had to withdraw the tariff when it became unfair owing to the general appeal for fuel economy, but up to that time they were in the happy position of having improved their business in two or three thousand cases. He foresaw some competition from certain solid fuel cookers after the war, but he was hopeful that future research in regard to the gas oven would raise the efficiency much higher than it was at the present time.

Dr. **Hartley** said a question had been raised about the effect of the standardization of calorific values. Standardization of gas quality, which was rather wider than calorific value, would certainly be of advantage in the future. With regard to Mr. Dyde's remarks on coke, one point he (Dr. Hartley) had tried to bring out was the advantage of the combined use of gas and coke in the new modern home, and that would afford its own solution to the problem of the load factor. It must be remembered that immediately prior to the war there was only between six and eight million tons of coke available, and he had said in his Paper that some 40 million tons of bituminous coal was burnt in the homes. Actually 40 millions was an under-estimate; it was at least 45 millions, and perhaps as much as 50 millions. If they were going to replace coal by coke they must produce very much more coke. After the war there would still be a big demand for coal-consuming appliances. The solid hotplate, which was one of the points in Mr. Dyde's criticism of the electric cooker, had exercised the minds of the Gas Industry, and they had done some very interesting experiments. They had designed experimental hotplates and handed them to members of their staff for trial in their homes, and they had found that people who were used to the open type did not take kindly to the solid hotplate. Mr. Browne had spoken of consumer service, and he could assure him that the appliance manufacturers realized that consumer service was essential. The manu-

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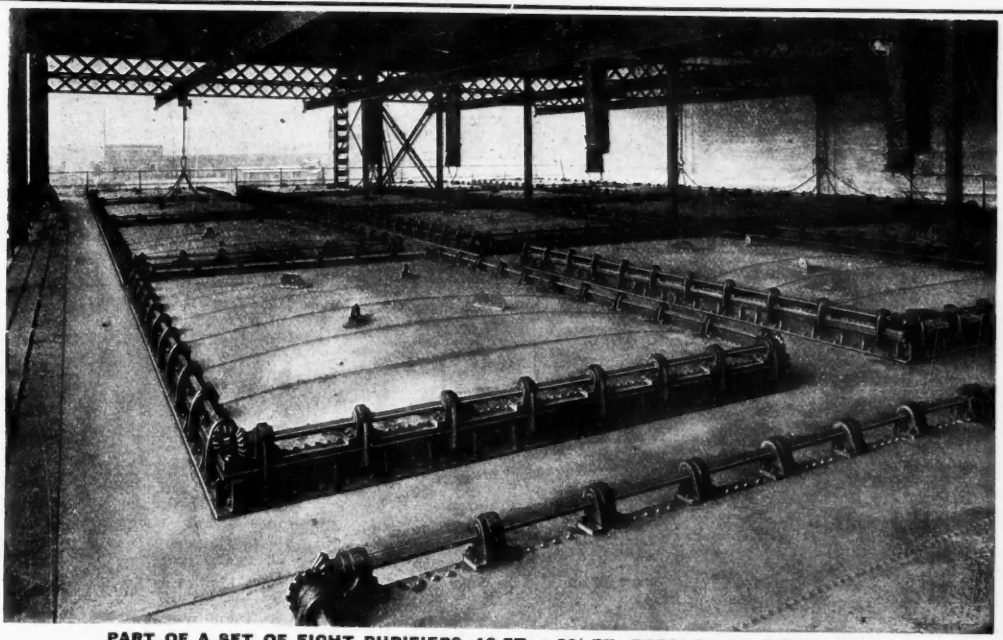

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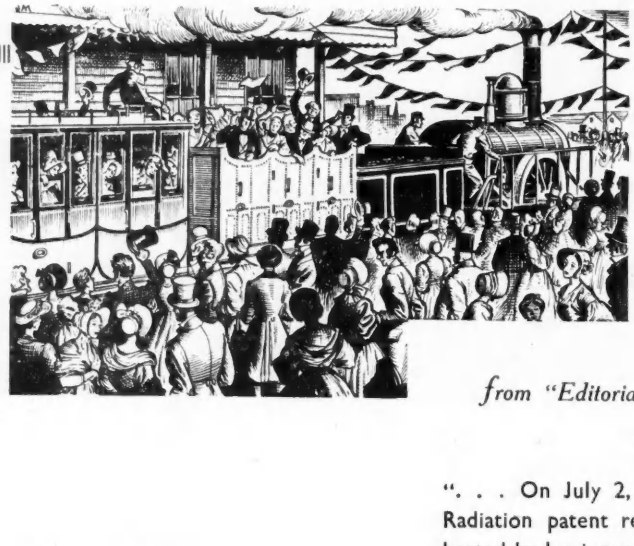

from "Editorial Notes," GAS JOURNAL, Jan. 17th, 1940

". . . On July 2, 1930, we published an abstract of a Radiation patent relating to a cobble type of inset fire heated by luminous flames. To the best of our knowledge this was the first occasion on which a brightly incandescent fire of the modern inset type was produced in which the gas was burned in the form of luminous flames, and thus silently . . .

. . . In June, 1937, it became evident that Radiation Limited would before long have available other types of gas fire which would not use the columnar type of radiant that had characterized gas fires since about 1907 . . .

. . . It is to us most stimulating, as we believe it will prove to others concerned with utilization of town gas, to know that the workers in the Radiation research laboratories, . . . should have had the courage to persevere and overcome the difficulties encountered. The results of this breaking of new ground will, we are sure, receive the full recognition and appreciation they deserve from the Gas Industry . . ."

facturer was the more successful in proportion to the extent to which he satisfied his consumers—who were the gas undertakings—and he was sure the same thing applied to the relations of the gas undertakings with the public. He thought they would have more serious competition from solid fuel than from the electrical side after the war so far as cooking was concerned. The wide range of oven efficiencies was rather startling, but it must be remembered that it covered a wide range of small and heavy oven loads.

Influence of the Architect

Mr. **R. S. Falkner** (Chesham) suggested that the Gas Industry's national bodies in the post-war era could render the Industry a great service if they were to direct the attention of the architect in regard to the construction of the cooking quarters in the average household. In the past there had been some excellent circulars and booklets prepared, principally for the information and instruction of the architect, but more frequently than not it had been left to the undertakings themselves to contact the architects concerned. It was said that at least four million houses would be wanted after the war; here were great possibilities for the Gas Industry if it could but overcome the difficulties of making contact with those whose duty it was to design the houses that were to be built. It was common experience to go into a scullery and find the gas cooker jammed in between a wall and a sink, where the housewife scarcely had room to stoop to see to the cooking; or perhaps it was fixed in a direct line of draught. In the larger type of kitchen or breakfast room it was sometimes found that to encourage the sale of the house the builder had put in a solid fuel grate. If architects could be encouraged to develop their plans and provide really good working space for the housewife it would help gas undertakings very much in selling gas and appliances. Personally he thought the ideal means of cooking was the eye level type of cooker, where the housewife had no need to bend or stoop to do her work. Everything was in her line of vision, and she was clear of fumes when the oven door was opened. There were few kitchens where cookers of that type could not be installed to-day. He supported the auxiliary type of water heater because he was of the opinion that they would have great difficulty in ousting entirely the solid fuel water heater. In a great percentage of houses, however, there were obstacles to putting in auxiliary systems. The pipes were sealed in bricks or hidden away in cupboards, and the tank was usually in a very confined space, and they were really up against great difficulties in selling water heaters. It would be a great help if builders could be persuaded to put in supplies when houses were being built; where this was not done it fell on the gas undertaking to bear the cost of putting in the gas. If their national bodies could get to work and contact the architects, not only the bigger men in the architectural field, but the smaller men who operated in the smaller districts, it would be a great help to them in selling appliances and in securing a fuller use of gas.

Dr. **Hartley** said he had made contact with a number of architects in the last year or so, and had spoken to them especially about room heating. He was impressed with the feeling that the architects, especially in the cities, who were going to be responsible for post-war housing, were very much alive to-day to the importance of ensuring satisfactory heat service, cooking conditions, and hot-water supplies. He had put it to them that they ought not to devote too much of their available space to what might be called "pretty" rooms, but that they should pay due attention to what was really wanted. The R.I.B.A. had put forward proposed designs for houses, and it had been said to the appliance makers, "Why don't you design kitchens?" They had to be careful; they were not architects, and the kitchen must be designed with reference to the rest of the house.

Mr. **Tennant** proposed a vote of thanks to Dr. Hartley, and said they should pay tribute to him for the work he had done in the Industry in the development of the domestic utilization of their product. He had done a tremendous amount of pioneer work and he was an authority on his subject. They owed him a debt of gratitude for what he had done and for the subject he had brought forward at that meeting.

Mr. **Dawson** (North Middlesex) seconded the vote of thanks, and spoke of the tremendous advance that had been made in the appliances which the Industry was now able to put out. They must see that they did not murder those appliances by sending out gas containing sulphur, or possessing bad combustion characteristics, or at varying pressures.

Dr. **Hartley,** in a brief reply, said he had seen considerable changes in gas appliances in the 31 years he had spent in the Industry. In coming into contact with representative men in other spheres he had found that when they were informed of the Industry's achievements in the utilization of gas and the study of consumers' interests they were impressed with what the Gas Industry had done. He believed that the gas appliances of to-day were well ahead of the appliances offered by competing fuels. They had a great deal of knowledge at their disposal, and they had no need to worry about the future. Prior to the war gas was used for some 20% of the domestic load. There was therefore still 80% of the field to capture.

The Grey Edition of the Papers which were presented at the 79th Annual General Meeting of The Institution of Gas Engineers in June, 1942, has now been published. The edition is complete with the full discussions and replies.

Infra-Red for Industrial Purposes

In the "JOURNAL" last week (p. 577) we referred to the use of radiant heat in industrial processes, pointing out that for many years the Gas Industry has employed radiant heating where high rates of heat transfer have been required. Processes such as fur drying, sealing-wax polishing, printing ink drying, and, of course, the grilling of meat and bread toasting have been carried out by this means. We pointed out, too, that in recent months the electrical Press has contained information on radiation drying under the title of "Infra-Red," with the result that some may have been led to believe that infra-red rays generated by electrical means have unique properties likely to revolutionize heating processes in general and paint-drying in particular. As a matter of fact, "infra-red" is radiant heating, though in the normal electrical application it has been limited to a range of infra-red rays emitted by the tungsten filament lamp which fall in a comparatively narrow range of the radiant heat spectra.

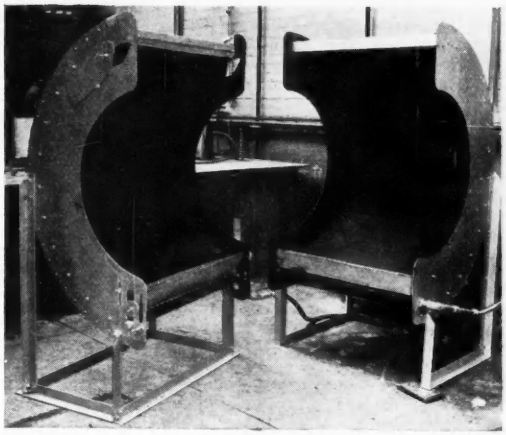

FIG. 1.—*Experimental Medium-Temperature Panels for Paint Curing—opened up.*

The Gas Industry is fully aware of the uses of infra-red heating, and in the available radiant heat sources the Industry is fortunate in having the experience of many years of practical application and research. The sources available are: (1) high temperature panels, such as the Cox (surface) combustor, and the gas fire type; (2) medium temperature panels, of the type commonly employed for space heating. The high temperature panels give a very high flux density, normally of the order of 350 B.Th.U./hour per sq.in. (equivalent to 100 watts per sq.in), compared with the maximum of 35 B.Th.U./hour per sq.in. (equivalent to 10 watts per sq.in.) of the tungsten filament lamp; while the medium temperature panels can be adjusted to give flux densities up to 35 B.Th.U./hour per sq. in. (equivalent to 10 watts per sq.in.) as required. Both types have the advantage of uniform radiation without the use of reflectors, they are of the simplest form of construction, very robust, require little maintenance, and have an operating life of many years. Owing to the simplicity of their construction their initial cost is low, and they require no special installation features other than the normal supplies.

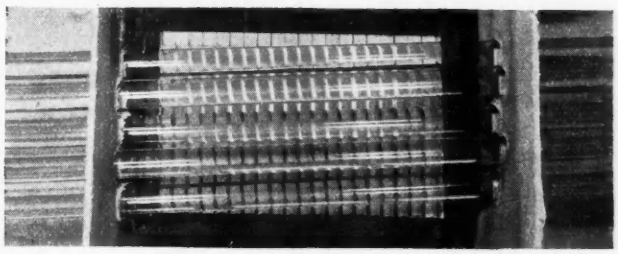

FIG. 2.—*Assembly of High-Temperature Panels for Heating Acids in Tubes—front panel removed.*

Research by the Gas Light and Coke Company at Watson House on the use of infra-red has resulted in the development of special heaters for many industrial purposes, and recently attention has been directed to the special problem of curing the heat transformable paints used for protecting sheet metal objects. Fig. 1 shows two

experimental large medium temperature panels. Such panels can be built up into tunnels of any desired length for this type of work. The results obtained have confirmed earlier experience, and it has been shown that paints requiring 25–30 min. at 250°F. in a convector oven can be dried in about half a minute in this tunnel—and the air temperature in the tunnel is only 15°C. higher than atmospheric. There are no patents or registered designs on this development, and in accordance with the Gas Light and Coke Company's usual policy they are prepared to make any information available to the recognized industrial oven builders, and the manufacturers of industrial gas equipment, also paint manufacturers. It is recognized that from the practical and commercial point of view many improvements in design and appearance can be made.

The use of high temperature sources for the drying of paint on heavy objects such as shells has been developed since the war by a well-known manufacturer of drying ovens; unfortunately, little publicity has been given to these installations, and it is unlikely that detailed particulars could be broadcast in wartime. Full information would, however, be available to anyone engaged on essential work.

The use of infra-red for purposes other than paint drying has also made considerable progress, since the gas high-temperature panel, of which several proprietary types are available, has the great advantage of high flux densities enabling soldering and brazing operations to be carried out on mass production lines. One interesting development investigated by the Gas Light and Coke Company is the heating by means of high temperature panels of acids flowing in glass tubes. Fig. 2 is a photograph of the experimental arrangement with the front panel removed to show the tubes. The panels are mounted on a movable framework, which can be wheeled into any position and gives free access to the tubes if required. Many more applications could be quoted, but these are sufficient to indicate that research by the Gas Industry on this problem to help the war effort has not been lacking.

A number of firms have already shown considerable interest in these developments at Watson House, and recently a test was carried out on a well-known type of petrol can using the same paint as that used when dried in the electric infra-red tunnel, the drying time in the panels shown in fig. 1 being about 4 min.

Electric Gas Treater for Nitric-Oxide Removal*

By WARREN CHURCHILL,
Chief Chemist, Boston Consolidated Gas Company

THE Koppers electric gas treater was placed in service at the Everett plant of the Boston Consolidated Gas Company in April, 1941. This treater was designed for a maximum capacity of 60 million cu.ft. per day of coke oven gas mixed with carburetted water gas. The load, although mainly coke oven gas, would during the winter season contain up to 25% carburetted water gas.

The nitric-oxide content of the coke oven gas entering the plant at Everett fluctuates between 12 and 35 grammes per million cu.ft., which would correspond to 0.9 to 2.5 parts per million by volume. The nitric-oxide content averages 25 grammes per million cu.ft. or 1.8 p.p.m. If this concentration of nitric oxide was allowed to remain in the gas entering the storage holders there would be sufficient vapour-phase gum formed to cause severe pilot-stoppage trouble. The nitric oxide together with the 0.6–0.8% oxygen and certain hydrocarbons normally present in the gas react to form this gum.

The oxidation of nitric oxide to nitrogen peroxide is known to be the time-consuming element, while the reaction of the nitrogen peroxide with the hydrocarbons proceeds very rapidly in producing the vapour-phase gum. This gum is then precipitated as a highly-dispersed suspensoid, which is deposited on pilot needle valves, the seats of thermostatic valves; in fact, any point in the system where there is a sudden change in velocity or direction of gas flow.

In the electric treater, the oxidation of nitric oxide to nitrogen peroxide is accelerated by the use of a brush-type corona discharge, permitting the vapour-phase gum to form and drop out before gas leaves the plant.

The electric gas treater consists of four units connected in parallel to a 42 in. manifold, with 30 in. gate valves on the inlet and outlet of each unit. A unit is made up of two adjacent shells 9 ft. 6 in. in diameter by 13 ft. 3 in. high, tied in near the base so that gas passes through them in series. The outer surfaces of the shells are covered with a 1½ in. layer of insulation which is coated with roofing compound and painted for protection from the weather. The gas entering at the top of the first shell of a unit passes down through an electrode assembly consisting of 14 smooth plates of hardened aluminium which are electrically grounded. Evenly spaced between these, there are 13 discharge electrode plates rigidly fastened together and mounted upon four porcelain insulators.

Each discharge electrode plate contains 4,253 pins which pass through it perpendicularly. These pins made of special alloy steel have swaged points on both ends which project out equidistant from either side of flat plate.

The pins are made to be uniform within a close tolerance and are carefully assembled on the plates so that the swaged points will remain sharp. This is necessary, as efficient operation of the treater depends on the uniform clearance between the points and the smooth grounded electrode, as well as the condition of these points.

Each porcelain insulator supporting the discharge electrodes is located in a separate compartment at the base of the shell. The compartments are heated with copper steam coils so that the insulators can be maintained free from condensation of the moisture present in the gas.

The gas passing down through the electrodes of the first shell is subjected to the brush-type corona discharge which takes place between the many sharp points and the smooth plates of the grounded electrodes.

This gas then enters the second shell at the base and passes up through a second set of electrodes which is a duplicate of the first.

Leaving the treater at the top of the second shell of each unit, the gas, having had its nitric-oxide content converted for the most part to nitrogen peroxide, now goes to the catch boxes. The vapour-phase gum which has formed in the gas leaving the treater drops out in the oxide of the catch boxes or later on in the storage holders.

The treater units are operated on alternating current from a 550/38,000-volt transformer which has taps on the primary winding to give voltages from 34,000 to 38,000 in 1,000-volt steps.

The discharge electrode in the first shell of each of the four units is connected through a 10,000-ohm stabilizing resistance and a disconnect switch to one terminal of the transformer. The discharge electrode in the second shell of each unit is connected through a 10,000-ohm resistance and disconnect switch to the other terminal of the transformer. In this manner the two discharge electrodes in each unit are placed in series in reverse order in respect of each other. According to E. V. Harlow, Koppers Research Division, Koppers Company, the discharge gaps are placed in series for the following reason: A single asymmetrical electrode pair operating in coke oven gas or water gas tends to rectify the current, passing more current on the half cycle when the points are negative. By connecting two gaps in series and in reverse order there is always a point-negative condition in series with a point-positive condition and a symmetrical current wave is drawn from the transformer.

The instrument panel for the treater contains an ammeter, voltmeter, and watt-hour meter in the primary circuit. An auxiliary switch on the circuit breaker operates a horn as a warning signal when the breaker is opened by overload. A manually-operated induction regulator is provided to regulate voltage between taps on the transformer. Secondary current is indicated on an ammeter operated from a current transformer cut into the high-tension bus.

Although the four units of the treater are designed to be operated together when the load requires it, in practice just two units have been used at one time. This permits the two idle units to be cleaned and ready for operation when the other two become fouled.

To be sure the insulators are dry, the clean units remain idle for eight hours with the steam coils turned on, before the units are placed in service. In starting up the two units, the primary voltage is adjusted to the maximum that can be carried without undue fluctuations in the secondary amperage, the normal amperage being 0.25 amp. per unit when the electrodes are clean.

The nitric-oxide content of the gas leaving the storage holder is checked daily by the control laboratory. This normally varies between 0.25–0.40 grammes per million cu.ft. If this concentration goes up to 0.50 grammes per million, tests are made to determine the nitric-oxide content of the gas entering and leaving the treater. When in such circumstances the removal at the treater is satisfactory, then tests are made at the catch boxes and the inlet to the storage holders. When the catch boxes are found to be giving up nitric oxide, the trouble can usually be corrected by rotating them. During the summer months in very hot weather the storage holders have been found to give up nitric oxide to the gas.

A test covering an operating period of 115 days for units 1 and 2 has been recently concluded. An average of 56 determinations on the gas entering and leaving the units showed the removal to be 91%. The average inlet and outlet nitric-oxide content was 22.0 and 2.0 grammes per million respectively. The electrical-energy consumption was approximately 170 kw. hrs. per unit per day for this period.

The above results are very good when it is considered that the two units were operating on an average of 12% above their rated gas capacity.

* From a Paper to the New England Gas Association.

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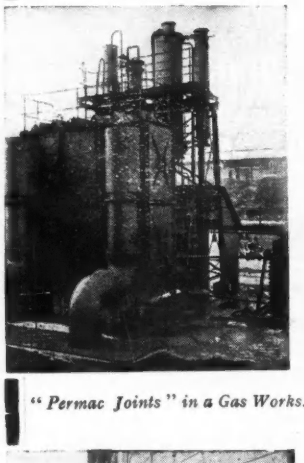

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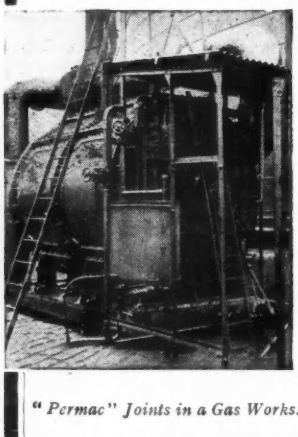

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Products Prices—Stocks and Shares

The London Market May 17.

All Coal Tar Products are in good demand, and Pitch in the London area remains about 45s.

The Provinces May 17.

The average prices of gas-works products during the week were: Pitch and Crude Tar,* Toluole, naked, North, 90's, 1s. 10d., pure, 2s. 5d. (controlled by the Control of Toluene No. 2 Order, July 3, 1941, which fixes the maximum price at which this material may be sold). Naphtha and Xylol controlled by the Coal Tar, Naphtha, and Xylol Order, 1942, dated Dec. 7, 1942, and operative from Dec. 21. Carbolic acid, 60's, naphthalene, and anthracene controlled by the Coal Tar Products Prices Order S. R. & O. 2509, dated Dec. 7, 1942, and operative from Jan. 1, 1943. Filtered heavy oil (min. gr. 1,080), 7½d. to 8d. Creosote oil has been generally controlled as to direction and price for some time past. Current value—fuel grades 5d. to 5½d.; timber preservation and other purposes 4¾d. to 6d.

* In regard to pitch and crude tar prices we would ask readers to refer to the editorial note on p. 396 of the "JOURNAL" for Sept. 10, 1941.

Tar Products in Scotland May 15.

Market conditions are unchanged. Refined tar controlled. Value is 4½d. per gallon *ex* Works, naked. Creosote oil: Specification oil, 6½d. to 7d.; low gravity, 7¼d. to 7½d.; neutral oil, 6d. to 6½d.; hydrogenation oil 5⅞d. per gallon; all *ex* Works in bulk. Refined cresylic acid is active at 3s. 6d. to 4s. 6d. per gallon *ex* Works, naked, according to quality. Crude naphtha, 6½d. to 7d. per gallon. Solvent naphtha: Basic prices delivered in bulk, 90/160 grade 2s. 8d., and 90/190 Heavy naphtha, Unrectified, 1s. 10½d., Rectified, 2s. 3d. per gallon. Pyridine: 90/160 grade, 13s., and 90/140 grade, 15s. per gallon.

The good news from North Africa gave a fillip to markets last week. There were more buyers in the gilt-edged market, and industrials took a harder tone with a fair sprinkling of price rises.

Gas stocks and shares were also more in evidence, business being on a heavier scale than the previous week. There was a good demand for Gas Light units, which closed 9d. higher at 17s. 3d.–18s. 3d. after a rise of 6d. a week ago; 5,000 of these units are available at 18s. 6d. Commercial ordinary was also supported and gained 3 points. More enquiries for North Middlesex 5% preference in the Supplementary List led to a further hardening in the price—a gain of 8 points being registered over the past fortnight.

The following is the complete list of price changes occurring during the week:

OFFICIAL LIST		
Associated Gas & Water Undertakings Ord. (*x.d.*)	19/—20/–	May 10
Ditto Deferred (*x.d.*)	19/3—20/3	,,
Ditto 4½ p.c. Red. Cum. Pref. (*x.d.*)	19/—20/–	,,
Ditto 4 p.c. Red. Cum. Pref. (*x.d.*)	19/9—20/6	,,
Ditto 4 p.c. Cum. Pref. (*x.d.*)	17/—18/–	,,
Commercial Ord.	60—65	+3
Croydon 5 p.c. Deb.	123—128	+1
Gas Consolidation 4 p.c. Red. Cum. Pref. (*x.d.*)	18/—20/–	May 10
Gas Light Units	17/3—18/3	+–9d.
Ditto 3½ p.c. max.	68—73	+3
Ditto 3½ p.c. Red. Deb.	96—99	+1
Imperial Continental	82—85	+2
Oriental Ord.	107—112	+2
Primitiva Holdings Ord.	13/6—15/6	+–6d.
South Metropolitan	76—79	+3
Ditto 4 p.c. Pref.	90—95	+1
South Suburban 5 p.c. Deb.	123—128	+1
United Kingdom Ord.	19/6—20/6	+–3d.
Ditto 4 p.c. 1st Cum. Pref.	19/—21/–	+–6d.
Wandsworth 5 p.c. Deb.	123—128	+1
SUPPLEMENTARY LIST		
Brighton 5 p.c. Deb.	122—127	+2
Croydon 4 p.c. Pref.	87—92	+2
North Middlesex 5 p.c. Pref.	103—108	+3
PROVINCIAL EXCHANGE		
Newcastle 4 p.c. Pref.	97½—98½	+2

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GAS JOURNAL, MAY 26, 1943

VOL. 241 95th YEAR No. 4175

EDITORIAL NOTES

FORECAST

OF unusual interest and, we hope, of considerable significance was the speech of the Minister of Fuel and Power at a recent gathering of the Fuel Luncheon Club, reported in our columns last week (p. 612). Major Lloyd George, addressing an audience composed of all the fuel interests, people accustomed to viewing fuel matters in their broader aspects, referred to some comments he had made shortly before when he spoke to the British Electrical Development Association. On that occasion he asked the electricians present to regard electricity supply not as a convenient medium for cut-throat competition, but in a spirit of co-operation with other fuel suppliers and on the basis that the interest of the consumer must have first place. His point was, we think, that expansion of electricity supply is in itself and unrelated to the supply of other forms of energy in the country, not a cause either for rejoicing or congratulation. His remarks, as can be imagined, did not go down very well, as he was quick to perceive. There was, he said, "silence still as death, and the boldest held his breath." That, of course, till he was out of earshot, when conversation hummed noisily if not merrily.

Major Lloyd George was, however, undismayed, undaunted, and unrepentant. He made this quite clear in his speech to the Fuel Luncheon Club. The electrical industry, he emphasized, must learn to co-operate—to co-operate for its own good and that of the nation and the consumer. One of the most important problems confronting this country is to make the best use of our fuel resources, and no industry can survive economically unless it realizes that its main duty is to its consumers. It is, or should be, accepted that gas and electricity are vital to the country's prosperity. We could not contemplate losing the by-products of the Gas Industry any more than we could contemplate losing the services in particular fields of electricity. Now there lies a field where there is no sharp definition between the services of the two industries—at any rate, on the face of it. There is a sort of intermediate zone, an area of contention. We ought to be capable of giving clearer definition to the relative merits, from the national point of view and that of the consumer, of gas and electricity in this intermediate zone. The benefits which gas and electricity are able to confer in this intermediate zone ought not to be prejudiced in cost or in extent by a struggle for mastery in this zone. The problem goes deeper than the mere gaining of business; it is essentially a national issue. It should not be a field for internecine warfare with extravagant propaganda pulling the community this way and that. Educational publicity—and all publicity is ultimately paid for by the consumer—comes into a different category.

The electrical industry looks to expansion after the war. It will have a high potential, and we are sure that expansion is right and, indeed, inevitable. But there ought to be channelling of this expansion in those directions calculated to benefit the community and the nation. And it must be realized that, with its carbonization processes, the Gas Industry is essential to the nation, and can in certain spheres supply energy in the form of gas and coke—both smokeless fuels—more economically than is otherwise possible, the while making available raw materials for a host of established and new chemical industries. Surely the primary task of the Minister of Fuel is to arrive at a composite fuel problem which, if not 100% perfect, will to a large extent at any rate eliminate gross abuse of our coal resources. The problem is many-sided, and we shall probably have to unlearn much which we have been led to believe is proper and even laudable. It is a problem the seriousness of which, as we have said before, calls for a new and broad conception of unity and co-ordination and warrants an impartial enquiry. We hope that the comments of the Minster of Fuel and Power to which we have referred can be regarded as in the nature of a forecast of a broader and more balanced conception of the fuel situation as a whole.

REVELATION

IT is, as we have said, good to have the necessity of recovering by-products from coal in the forefront of Ministerial thought; and it is to be hoped that the general community will eventually come to the conclusion that to throw away these products, by pushing them up a chimney flue connected with a raw coal burning grate, simply "is not done." So, to an extent, we were pleased to see the national Sunday Press, accustomed to providing a variety of light, entertaining, and informative thought for its millions of readers, tackling the subject a Sunday or so ago. Example, the *Sunday Dispatch*, May 16, where under the one-star feature "finance news" Edward C. Gayler had his bright and chatty technological say. His theme was to link up the purse of the investor with the potential value of the treated black diamond. Exploring the by-ways of the squander bug, he has discovered that at long last "we have reached a stage where we can find more to do with coal than just burn it away in our grates and in factories." And he follows up by remarking that the importance to Great Britain of our coal deposits is going vitally to influence our future prosperity. Which, we think, is true enough. And on this line of reasoning his Sunday financial tip was, so to speak, to put our shirts on coal. But we must be wary; we must not sink our money in mines where there is no provision for coal treatment, where the black diamonds delved therefrom are thrown into the domestic grate or the industrial furnace without being treated to recover fats and rubber and smelling salts, plastics, and dyes. No; as he sets out, some collieries just produce coal. Others own coke ovens and sell the tar by-product to distillation companies. And some companies (this presumably from the Author's inside information) are "already treating the tar to produce various by-products." Which is news. And, while we were told that investors who do not already hold coal shares should certainly acquire an interest, we were left with the impression that our less antique shirts should be placed only on collieries possessed of coke ovens.

Dawn of a new era? Be quick, while the going is good. Brighten up coal shares. After all, according to Mr. Gayler, we have "enormous quantities" of coal (our estimate is that Great Britain has less than 3% of the world's coal resources), and we must not burn it raw. Which we certainly must not, now that at long last we can, with the "new" processes available, recover by-products from it. We must subject it to carbonization. Not a word in the article, by the way, about the Gas Industry, which for over a hundred years has been recovering by-products in the "new" and approved manner. Perhaps mention of this would have dulled the poignant persistency of the Sunday message. Or would it? Apart from the Sunday Press, there is in process of development a real call for treating coal rationally in this country. There is an awakening to the rather obvious fact that we cannot afford to waste coal, that we must treat it scientifically. At the same time there is a gulf of difference between popularizing science and making science look

musty—as example, the *Sunday Dispatch* article and a subsequent one on the same subject in the issue of May 23. Not that we have criticism to make of those who feel the urge to drop their shirts down the mine-shaft. We would just remark that for about 150 years the Gas Industry has known how to recover the various by-products from coal, during the last war recovered by-products which were acknowledged to be essential to its successful prosecution, and during the present struggle, thanks to accumulated experience, is abundantly amplifying its services to the nation in this respect. The known scientific facts of the case would, at the present juncture, make quite a good story, and the carbonizing process ought in the future to earn both a safe and an adequate dividend.

PROGRESS AND EFFICIENCY

IN 1936 the British Gas Light Company purchased the Thetford Gas Undertaking; immediately the greater portion of the district mains was enlarged and relaid—a proposition which would have been a financial commitment beyond the resources of the Thetford Company. Subsequently storage capacity was increased and showrooms were opened. In the same year the Mildenhall Undertaking was acquired. A dilapidated carbonizing plant (the station meter, by the way, had not been working for a long time) was replaced; mains were extended; storage capacity was made adequate. The previous year the Brandon Undertaking was purchased. Here, also, storage capacity had to be provided. In 1937 came the acquisition of the Chatteris Undertaking. In this case, too, there had to be enlargement of mains and the erection of a holder. These bare facts are taken from the Presidential Address of Mr. L. C. B. Williams to the Eastern Counties Association last Thursday (see p. 640). It is the reverse of pleasant or encouraging to contemplate the condition of these undertakings only a year or two prior to the outbreak of the present war. They were obviously decrepit and incapable of fulfilling their proper functions.

Standing alone, not one of these little concerns could have called on the financial resources and skilled technical assistance required to carry out the schemes of reconstruction and extensions on the works and district which were essential to efficient working. One shrinks from thinking of the thermal efficiency of gasmaking at those works, one of which in effect did not possess a station meter, and at another of which extension of the retort-house meant encroaching into the sitting-room of the manager's house. And all this *circa* 1936. Not a good advertisement for the Gas Industry; hardly likely to add to its prestige or inspire confidence in the Industry's strength and its capabilities of service *vis-à-vis* electricity in a modern age. The position in regard to these undertakings has been remedied by speedy action backed by adequate financial and technical organization. While this situation has fortunately been retrieved, we have seen in the area covered by the Eastern Counties Association—reference was made to this at the meeeting—the demise of two small undertakings; death, through neglect, again hardly calculated to inspire confidence in gas, although, fundamentally, there is every ground for confidence. The trouble with the Gas Industry—and we are thinking of some, *not all*, of the smaller units, small but large in number—is perhaps over-confidence in the soundness of its case, which appears to have bred apathy which is alarming. Quite an appreciable section of the Industry wholly lacks any sense of urgency, and in this regard is lazy. No wonder the Ministry has issued an ultimatum that the Industry should formulate its plans and suggestions, not this year, next year, or never, but by August next. This lack of any sense of urgency on the part of many undertakings constituting the Gas Industry is, to say the least, pitiful. Also, it is quite inexcusable.

The Eastern Counties Association were lucky in having with them Mr. E. V. Evans, President of The Institution of Gas Engineers, who gave an immaculate Address on efficiency. The Gas Industry has, as we have said, a cast-iron case. It has a process, if properly operated, which is highly efficient thermally. But have we become rather complacent because of this possession? We talk about our 75% or 80% or 85% conversion efficiency. This, however, is a process figure, as we have been at pains to emphasize on several occasions this year. Six months ago we put the matter thus: A ton of coal contains 300 potential therms. If we take a fuel usage index of 26, which has been assumed to be a national figure, a weighted average, we have a thermal efficiency of gas production of approximately 53%. If we use this gas at 50% efficiency, the overall thermal conversion of coal to useful heat via gas is about 27%. This, by the way, is not a bad figure. It could be better; in many individual cases it is better; in some cases it is worse. Apart from thermal efficiency, we must always bear in mind that in the process we have recovered by-products the value of which cannot be accurately assessed on a thermal basis. Mr. Evans used rather different figures in arriving at an overall efficiency of 29.2% for the carbonization process (on the basis that 1 ton of coal yields 75 therms of gas (utilization efficiency 50%), 145 therms of coke (utilization efficiency, 25%), and 20 therms of tar (utilization efficiency, 70%). For best electricity practice he put forward a figure for overall thermal efficiency of 19% (this allowing for a generation efficiency of 29%).

Now this 29% overall efficiency of the Gas Industry can be improved. It can be improved in the first instance by reducing the fuel usage index; it can, concurrently, be improved by raising the standard of efficiency of gas appliances and coke appliances. The efficiencies quoted by Mr. Evans will be improved upon. For example, a sulphur-free gas burned fluelessly gives an efficiency of 90% when used for space heating, and we can anticipate much higher coke utilization efficiencies—for instance, 70 to 80% in slow combustion stoves. So that our figure of 27% or 29% can be raised, while there is not the same scope with electricity's 19%, and with electricity generation we derive no by-products. It is, so to speak, an "all-consuming" process.

What we would emphasize, however, is that our figure of, say, 28% for the overall efficiency of the Gas Industry is based on good works procedure. In the earlier part of this note we referred to certain small works which by no manner of means could have a fuel usage index of 26. Suppose they had a fuel usage index of 50. Translate this into thermal efficiency of gas production; translate this again into thermal efficiency in use, to give overall efficiency. Then we have something to think about. We shall arrive at the conclusion that we cannot afford to have inefficient units in the Gas Industry, that we cannot afford to be complacent, that a retort-house extension which involves encroachment into the sitting room of a manager's house is not in keeping with the times or in accord with national fuel economy and current ideas of gas service. That we ought to have station meters at our works, and that, in brief, we ought to wake up. And we ought to remember that the alarm has been set by the Ministry of Fuel and Power.

Diary

June 8.—National Federation of Gas Coke Associations, General Committee, Gas Industry House, 9.30 a.m.

June 9.—Institution of Gas Engineers, Annual General Meeting, London.

June 9.—National Benzole Association—Annual General Meeting, Wellington House, Buckingham Gate, S.W. 1, 3 p.m.

June 21.—London and Counties Coke Association, Gas Industry House.—Finance Committee, 11 a.m.; Executive Committee, 11.30 a.m.; Central Committee, 1.30 p.m.

The fact that goods made of raw materials in short supply owing to war conditions are advertised in the "Journal" should not be taken as an indication that they are necessarily available for export.

Personal

At the request of the Ministry of Fuel and Power, Dunfermline Town Council has agreed to release Mr. JAMES CAMPBELL, the Corporation's Gas Engineer and Manager, to take over the post of Regional Gas Officer for Scotland. Mr. Campbell has been Manager at Dunfermline for 25 years and before that held similar posts at Polmont and Bo'ness. In 1926 he was President of the North British Association of Gas Managers.

* * *

Mr. A. F. OATLEY has been appointed an additional Director of Cannon Iron Foundries, Ltd. Prior to joining the firm, Mr. Oatley held the position of Sales Superintendent to the United Kingdom Gas Corporation.

* * *

Mr. F. J. SMITH, Works Superintendent of the Kidderminster Gas Company, has been appointed Engineer and Manager of the Burgess Hill Gas Company.

Obituary

Mr. JOSEPH HARGER PYE, F.C.S., M.I.Mech.E., died on May 23 at Clevedon. He retired from the position of Engineer and Managing Director of the Clevedon and Yatton Gas Company last year after 43 years' service.

* * *

Mr. JOHN GIBB, who was formerly Manager of Newton-on-Ayr Gas Company, Ltd., died on May 15.

* * *

The death occurred recently of Mr. FRED OLDHAM, Secretary of the old Hyde Gas Company. On the formation of the North Cheshire and District Gas Company in 1936, which amalgamated the areas supplied by Hyde Gas Company and Denton and Dukinfield Corporations, he retired, after over 40 years' service with the Company.

Letter to the Editor

Co-Partnership

DEAR SIR,—The subject of co-partnership taken up by Mr. Wm. Cash ("JOURNAL" of May 12, p. 579) was not one of the main points I wished to make in my recent article, and my comments were thus kept as concise as possible. Perhaps you will allow me to reply briefly to Mr. Cash.

It cannot be denied that the extension of piece-rate systems ousted co-partnership in many industries because of the greater incentive possessed by piece-rate methods—due primarily to the tangible reward for hard work contained in the pay envelope each week. Of course, piece-rate methods are not generally applicable to the Gas Industry, although they are used by many undertakings as widely as possible *in addition to co-partnership*, presumably to make up for the lack of incentive of the latter. The quotation which Mr. Cash takes from my article may perhaps be preferably italicized thus: "The value of co-partnership *as an incentive is nil*." That the scheme has to be "explained to the workpeople"—I think a more correct term would be "preached"—is sufficient evidence that its rewards are not immediately evident. The incentive therefore cannot be obvious. I reassert that it is worth while attempting to find a bonus incentive system which reflects the efforts of the Industry's personnel both individually and collectively more closely than does co-partnership. Admittedly this would be a difficult problem.

My main contention must be, however, that my experience of co-partnership in action in both large and small undertakings does not coincide with that of Mr. Cash. I have been a "questioner," and, perhaps what is more important, a "listener" in close personal contact with men, mainly on the works. The Industry employs a large percentage of unskilled labour and these men cannot afford to be very interested in saving. They live too near what is commonly called the "bread line" even in peacetime. To them the retention by the company of bonus payments which they consider to be part of their earnings is unjustified, particularly when they are faced with unexpected expense. Hence the demand frequently made for permission to sell shares—a practice which, if allowed by the management, would destroy the co-partnership scheme. These workers need money more when they are bringing up a family than when they retire.

The provision of facilities and the encouragement to save by investment in the worker's own company is, of course, highly desirable, but it is doubtful if the compulsory method of co-partnership is the best. Moreover, the establishment of a pension scheme does not necessitate a co-existent co-partnership scheme.

Mr. Cash says that "the opportunity to invest is regarded with pleasure, as is evidenced by the substantial holdings . . ." Surely the amount of the holdings is fixed by the undertaking and does not represent voluntary purchase of shares. It would be interesting to know what proportion of the "withdrawable" bonus is applied to the purchase of further shares by the average co-partner.

Co-partnership in its literal sense involves a share in the management of an undertaking in proportion to the workers' shareholding. So far as I am aware this is always withheld by managements. Were it not so, the "pride in the company" might be a little more in evidence.

It is true that in many cases there does exist an *esprit de corps*, a "genuine enthusiasm" and a "pride in the company"—terms beloved of co-partnership committees—but I suggest that these are produced more by good management and welfare organizations than by co-partnership. They would not be found in an undertaking with a co-partnership scheme and a bad management.

The security of employment which co-partnership tends to create is a mixed blessing. Insecurity is often a greater incentive to better work. The casual labourer sees his securely employed co-partner mate frequently slacking, and he naturally feels somewhat sore at "dividend time." Managements would do well to use their power of suspension of co-partnership agreements more rigorously to stop these abuses, and to find a means of recompensing the good worker not admitted to co-partnership because he is too old.

Finally, if the proposals in the Beveridge report are implemented to provide increased financial assistance in old age the main pillar of the co-partnership system will be undermined.

Yours faithfully,

May 18, 1943. "FUTURIST."

Calculation by Nomogram

A useful service has been rendered to the Gas Industry by the Parkinson Stove Company, Ltd., in the distribution to undertakings throughout the country of a wallet containing the six nomograms which were recently featured in their technical advertising. Problems requiring calculations based on standard formulae, such as the flow of gas or water in pipes, frequently confront the busy engineer, and these nomograms have been designed with a view to the easy solution of such formulae without recourse to the slide rule or mathematical tables. The nomograms cover (1) flow of gas in service pipes, (2) gas in low-pressure mains, (3) gas through orifices, (4) gas in high-pressure mains, (5) water in pipes, and (6) steam in pipes, and all that is necessary is the insertion of a series of straight lines, the required solution being indicated at the point of interception of the appropriate scale by the last line drawn. The ready use of the nomograms is further facilitated by the fitting of the wallet with a Kodatrace panel on which the lines may be drawn to complete any calculation; when the solution is no longer required it can be erased with a soft rubber, and the panel is then ready for further use.

An Attractive Fuel Economy Exhibition was staged in the Greenock Gas Showrooms in conjunction with the "Wings for Victory" Week.

The Annual Meeting of the Wales and Monmouthshire Association of Gas Engineers and Managers will be held in Cardiff on May 27, when Mr. A. E. Pask will deliver his Presidential Address and Mr. E. V. Evans, President of The Institution of Gas Engineers, will also address the members.

Falk, Stadelmann & Co., Ltd., have recently added to their Board Mr. C. J. B. Gregg and Mr. B. G. W. Cole, who for the past fifteen years have held the position of Local Director at Glasgow and Manchester respectively.

Thousands of Visitors thronged the Showrooms of the Cambridge University and Town Gas Light Company, where a most ambitious Exhibition was open from May 8 to 15 in support of the local "Wings for Victory" campaign. Official recognition of the public-spirited and practical manner in which the Gas Company had co-operated was given towards the end of the week, when the Mayor and Mayoress (Sir Montague and Lady Butler) paid a visit to the Exhibition, accompanied by Air Vice-Marshal M. D. K. MacEwen. The party was welcomed by the Chairman of the Gas Company (Mr. J. F. Cameron), the Vice-Chairman (Mr. F. J. Dykes), and Mr. J. Hunter Rioch (General Manager and Secretary), who was congratulated on the excellence of the whole arrangements.

Dividends

Parkinson & Cowan, Ltd., recommend a first and final dividend on the ordinary shares of 5% actual, less tax, for the year ended Dec. 31, 1942 (same). Profit for the year is £48,423, against £45,395 for the previous year.

Dougall's Gas Meters, Ltd., of Chiswick, are paying a dividend of 7% on their preference capital in respect of the year ended Dec. 31, 1942, and 7% on their ordinary capital for the three years ended Dec. 31, 1928.

The Directors of the Imperial Continental Gas Association announce that they are unable to recommend the payment of a dividend for the year ended March 31, 1943, on the £5,600,000 Capital Stock of the Association. It is hoped that the report and accounts for that period will be available by June 2. The general meeting is to be held at 2, Devonshire Square, Bishopsgate, E.C. 2, at 12.30 p.m. on June 11.

EASTERN COUNTIES ASSOCIATION

A HALF-YEARLY (the 102nd) Meeting of the Eastern Counties Gas Engineers' and Managers' Association was held on May 20 at Gas Industry House under the Presidency of Mr. L. C. B. Williams (Thetford). Welcoming those present—and there was a good attendance of members—Mr. Williams said how pleased they all were to have with them the President of The Institution of Gas Engineers, Mr. E. V. Evans, who had accepted the Association's invitation to address them.

Following the formal opening of the business, Mr. Williams asked Mr. F. H. Robinson (Bishops Stortford), the retiring President, to accept a silver salver, appropriately inscribed, as a token of the Association's appreciation of his services as President, an office he had filled with efficiency and dignity, and to the great satisfaction of all. Mr. Robinson, returning thanks, said that, while he hoped his year of office had been successful from the point of view of the Association, he personally had thoroughly enjoyed it and had found it full of interest.

At this stage Mr. Williams announced with regret the death of Mr. A. Gregory (Harwich), a Past-President of the Association and a member for 23 years.

After unanimous agreement regarding election of new members, and similar approval of the Committee's annual report and statement of accounts, Colonel J. Kennington (Grimsby) proposed that the sum of £30 should again be donated to the Benevolent Fund of the Institution. In doing so Colonel Kennington stressed the desirability of making individual contributions to the Fund in the form of deed of covenant. The proposition was seconded by Mr. J. H. Troughton (Newmarket) and carried.

Then came Mr. Williams's Presidential Address, in which the President outlined the type of work involved in raising the standard of efficiency of small works—a subject of obvious importance and topical interest. A substantial abstract of the Address follows. Proposing a vote of thanks, Mr. R. A. Weston (Norwich) remarked that the Address covered a subject bound to loom large in the Industry's organization for future service on a co-ordinated basis. Recently, in the area covered by the Association, two small undertakings had been allowed to go out of existence. He thought it almost unnecessary to emphasize the adverse effect on the Gas Industry as a whole of the cessation of gas facilities in particular districts, however small, rural, or remote. Which led him to comment on the proved value of grouping, for there could be no gainsaying the benefit which arose from the taking over of small companies by a parent holding company.

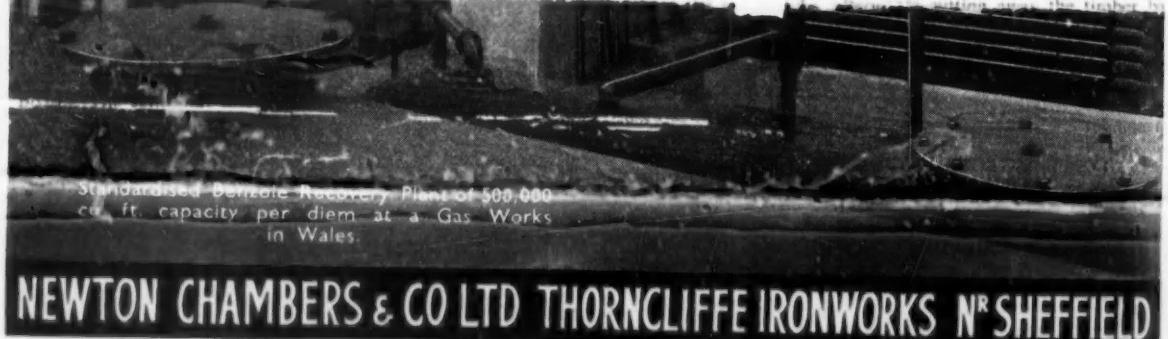
Seconding the vote of thanks, Mr. T. C. Battersby (Watford) suggested that the Address was a record of achievement in the controlled development of the smaller undertaking.

And this brought us to the Address of Mr. Evans (see abstract on page 643), delivered immaculately to a keen audience. Thanks for the Address were proposed by Mr. J. Hunter Bloch (Cambridge), who remarked there was no doubt that in the future there would have to be more reliance on the chemist than there had been in the past, and all present must have been inspired by what Mr. Evans had said: inspired by his enthusiasm and his confidence, a confidence based on a recognition that industry prepared for changes, an Industry in which purely personal interests would be subordinated to the common [illegible] Higher standards of gas supply must be achieved and maintained; every undertaking must be prepared to guarantee the quality [illegible] Implementation of this [illegible] lies in the hands

in that year replacing a small set of water-lute boxes. Reduction in purifying costs resulted. A tar dehydration plant was installed, designed for gas firing in order to economize labour. This has since been converted to coke breeze firing and has proved very satisfactory. About this time a suggestion was put forward that the undertakings at Thetford, Fakenham, Watton, and Swaffham should amalgamate and function as a group. It was realized that many benefits would accrue, but difficulties were encountered and the proposal was dropped.

The output of gas in 1928 had increased to 18 million cu.ft. and additional storage capacity had to be provided. It was decided to build a three-lift spiral holder into an existing cast iron tank, thus increasing the storage of that particular holder from 10,000 to 40,000 cu.ft. During the following year the existing coal sheds were reconstructed by direct labour and a weighbridge was installed. A small showroom was opened in the town. An advertising campaign was conducted, and exhibitions were held in the local hall with cookery demonstrations. These exhibitions proved extremely popular. By 1931 the output had increased to more than 21 million cu.ft., and it was found necessary to extend the existing retort house, or purchase additional land and build a new house. The latter course was decided upon, and the horizontal system (stop end) was adopted. A Morris scoop charger was installed to save labour and eliminate the wastage of hand charging. A retort-house governor and Cort's anti-dips were included. A hand-operated method of hot coke quenching was adopted. We designed a coke spray by which the quantity of water was increased. The method more than doubles the life of hot coke barrows, and I believe it has been adopted at other works. The go-ahead policy of the Directors was amply justified. By 1935 the output had increased to more than 24 million cu.ft., and the leakage reduced to 7.96. A Cort's coke breaker was purchased to meet the demand for broken coke.

In 1936 the British Gas Light Company purchased the undertaking. Immediately the greater portion of the district mains were enlarged and relaid, which would have been a financial commitment beyond the resources of the old Company. Hire purchase facilities were extended which consumers were quick to appreciate. The need for adequate showroom accommodation was met by the purchase of a site in the main shopping centre. The existing building was demolished and a showroom and offices were erected. The office provides accommodation for the staff carrying out the work of the five undertakings. In 1938 the demand for further storage made it necessary to add a further lift to the single lift column guided holder. As the other holder only held 40,000 cu.ft. it was desirable that the column holder should be in commission while the additional lift was being added. In the first instance the guide framing was extended to accommodate the outer lift. A timber structure was then built on the crown, and the crown guide rollers transferred to this timber framing and fixed on specially constructed carriages. The top and bottom curbs were assembled on the timber superstructure and the side plates added which completed the outer lift. Eight suspension rods, with screw jacks, one from each special carriage, with a claw under the grip were made ready for lowering the lift. Temporary angle guides had been attached for stability. The guide rollers on the bottom curb of the inner lift were then removed (these had been packed with wool blocks and transferred to the bottom curb of the outer lift in place of the [illegible] to lower the latter to within [illegible] of the water line and take the weight of the [illegible]


Standardised Benzole Recovery Plant of 500,000
cu. ft. capacity per diem at a Gas Works
in Wales.
NEWTON CHAMBERS & CO LTD THORNCLIFFE IRONWORKS NR SHEFFIELD

outside walls carried on a girder and stanchions in order to allow the width of the house to be increased by building an extension to it almost to the river edge. The cellar is situated below river level, and although several exceptionally heavy floods have been experienced it has remained free from water. In the new house a bench of retorts was installed with one setting of six 21 in. by 15 in. and one of four in an arch capable of taking six, and the old retort house is now being used for coal storage.

A piece of land adjoining the works was purchased and a spiral-guided holder of 30,000 cu.ft. capacity was built, designed for an additional lift. Before the holder could be brought into operation the water lute purifiers had to be converted to dry lutes, because of the higher pressures. The smaller of the two original holders was scrapped, the tank being used for tar and liquor. No proper stores existed, so we adopted a course taken at other of my works and purchased an excellent sectional Boulton & Paul wooden building and have found it entirely satisfactory. I would recommend this course to any manager without stores as an inexpensive and easy solution of the problem—in times of peace, of course, when timber controls no longer function.

Brandon

Brandon works was purchased by the British Gas Light Company in 1935 and was thus the first in the Thetford area. Thus when Thetford was acquired in 1936, it was logical to place Brandon under Thetford aegis. Already a supply of gas had been taken to an outlying district and a large number of consumers added. A showroom was opened in the main shopping street of the town; the sales of appliances showed a heavy increase. Recordings were taken of pressures at the furthermost points on the district, and these indicated that at peak loads pressures were inadequate. Tenders were therefore invited for the supply and erection of a spiral-guided holder of 30,000 cu.ft. capacity to the same specification as that erected at Mildenhall. When this was brought into commission conditions were brought up to our normal standard on the district and fluctuations of calorific value were practically eliminated. This was undoubtedly due to the fact that the inlet and outlet pipes of the new spiral holder were diametrically opposed, whereas those of the original holder were placed side by side, allowing the gas from the inlet to pass straight to the outlet without mixing.

Littleport

Taken over in July, 1936, this undertaking was generally in sound condition. A new holder of 30,000 cu.ft. capacity had been completed; purifiers and other plant were of adequate capacity. It was decided, therefore, to concentrate on the district and, as in other towns, the consumers were quick to appreciate the extended facilities offered them in the purchase of appliances. A lock-up showroom was already in existence but space was cramped. Arrangements were therefore made for the showroom to be extended to afford room for an office. At the same time the showroom was redesigned to modern requirements.

Chatteris

Purchased by the Company in 1937 it was evident that an extensive scheme of relaying the district mains must be carried out immediately. A belt-driven fan booster was used for increasing pressures and a drop of 90 10ths was experienced between the works and the outlying district. Several miles of main were enlarged [illegible]

the central authority this Development Board, on which he hoped the best brains of the Industry would serve, so that it might give direction—not control—and assistance to the districts and to all the undertakings in the districts.

He noticed that Dr. Hartley had suggested that promotional tariffs should not be encouraged. In one of the Post-War Planning Committee's reports it had been stated that apparently there was no information yet available to show whether tariffs were of serious value to the Gas Industry. He very much hoped that before the Committee ceased to function such information would become available, because he could not believe that well-constructed tariffs were not of the greatest importance to the Industry. His own Company tried to put up a model tariff in 1936, but it had disastrous results. It had every reason behind it in the matter of equity, but it was psychologically wrong, and they then turned their attention to a voluntary tariff. Figures taken from the latest returns relating to six London County

*An Address to the Southern Association of Gas Engineers and Managers Eastern Section)—published in last week's "JOURNAL," pp. 583 *et seq.*

reliable and competent local managers who give me the utmost loyalty—a prime necessity at all times but more especially in these difficult days. In peacetime I visit each undertaking at least once a week, and more frequently when circumstances call for it. Even in wartime the average remains much the same.

In normal times we are able to form a pool of skilled labour, both for works and for districts, which is at the service of any undertaking in the group. We have concentrated bookkeeping, records, and office work at Thetford, and as Manager I have all the information and detail there to enable me to deal expeditiously with the day-to-day correspondence and returns of each undertaking. When it is realized that individually few of such works could afford the services of a clerk, let alone a shorthand typist, the saving and efficiency resulting will be appreciated.

Standing alone, not one of these little concerns could have called on the financial resources and skilled technical assistance required to carry out the schemes of reconstruction and extensions on the works and district which were essential to really efficient working. Doubt has been expressed in some quarters as to the ability of the small undertaking to function efficiently and provide adequate service or to hold its own at all in the stress of post-war competition. This view may be in some measure justified in the case of the isolated small works playing a lone hand; for without the assistance of fully qualified officers and the means for carrying out improvements and extensions, such an undertaking may well be hard put to it to maintain that high standard of efficiency which competition and the times demand.

Physical linking up in East Anglia is in many cases not an economic proposition, and the country after the war will be in no position to indulge in the luxury of expenditure which does not yield a return of at least improved efficiency and service at no greater cost. But in grouping and co-ordination there is a very effective alternative which in the light of my own experience I consider is the answer to the critic, and should form the basis of any regional planning.

Interpretation of Efficiency

by E. V. EVANS, O.B.E.,

President of The Institution of Gas Engineers

Recently the Parliamentary and Scientific Committee has issued a report on Fuel and the need for further research. In this report it is stated that from all the coal consumed in the country only some 30% of the energy is usefully employed, the remaining 70% being wasted. I know how proud we are that our carbonizing process operates with a thermal efficiency approaching 80%. That is to say, it results in the recovery of 240 of the 300 therms originally present in the coal. But that is only the thermal efficiency of the process. When we come to use the products—gas, coke, and tar—their efficiency in use must be taken; and the overall efficiency in use, starting from the original coal, is much lower. I am therefore using three terms:

(1) Thermal efficiency of production.
(2) Efficiency in use.
(3) Overall efficiency.

Now this question of computing efficiency in use is a matter upon which gas chemists seem to delight to argue, and there are indeed many ways of approaching the problem. In order to develop a point [illegible]

past, but other industries had put forward [illegible] possibly extend to the whole of their consumers. If they put forward an uneconomical tariff to secure a certain load they had to penalize one or more of the other loads. He urged that they should have low commodity tariffs, and that they should be economic. With regard to relative costs of gas and electricity, the position, based on present-day appliances, was that in order to compete with gas, the cost of electricity per unit for cooking must not exceed one-twentieth of the cost of gas per therm; thus if gas was sold at 10d. per therm, the charge for electricity must be a halfpenny per unit to compare in cost. On the question of the domestic incinerator, the difficulty was that they had to get rid of a large amount of moisture, and the gas incinerator had not so far been a success. For incinerating purposes the coke boiler was effective. As regards the design of gas fires, he believed the gas fire should have its own individuality, and that it should be characterized by features which are in keeping with the fuel used. There should be no attempt to make it simulate the appearance of some other type of appliance. On the question of

water heating there was now a strong division of opinion as to the type of water heater likely to be most successful. Conditions would vary throughout the country, but the point he would make was that relatively speaking gas was a dearer fuel in prime cost than, say, solid fuel, and they must see that the hot water service was at least as effective as that provided by competing apparatus.

Women's Advice Wanted

Mr. **A. Tennant** (East Surrey) said the title of Dr. Hartley's Paper raised in his mind the necessity of having the co-operation of women at the present time with regard to the future planning of the industry, and also in the future on the commercial side. At present a lot of women were in business or industry and a lot of them had become very highly trained, and personally he did not think they had made sufficient use of them in their own business. They had not had the benefit of their advice so much as the electrical people had. He urged that they should seek the advice of women now, particularly with regard to planning. He would like to ask Dr. Hartley whether he though the standardization of calorific values throughout the country would help them in their post-war activities. Another point with which he was much concerned was the burden of maintenance of appliances on the district. He would suggest to Dr. Hartley that in the design of post-war appliances the question of maintenance should be given very careful consideration. He wondered whether he would care to say a few words with regard to the qualities of luminous burners as compared with the bunsen flame. He hoped the cost of appliances after the war would not be a stumbling-block, and he wondered whether the purchase tax was likely to be continued, and what effect that would have on the commercial development of their business. He hoped that the uneconomic competition between gas and electricity would not continue after the war.

Colonel **Bywater,** referring to Mr. Tennant's remarks about women, pointed out that there was to be a women's section in the proposed new Development Board about which he had spoken.

Dr. **Hartley** said it was perhaps not realized that the gas appliance manufacturer did in fact discuss with the women members of his staff the design of appliances in which they were particularly interested. His company also made it a practice to see that new apparatus was well tried out before it was offered to the gas undertakings. That involved testing the appliances in homes up and down the country, and in that way they also got the views of the womenfolk. He was interested recently, in discussing certain new ideas for a gas cooker with his own wife, to find there was only one thing in her mind that mattered. She was not concerned with efficiencies or consumption, but wholly with the idea of making cleaning easier. Mr. Tennant had spoken of maintenance from the undertaking's point of view. Maintenance from the housewife's viewpoint meant cleaning. They regarded maintenance as one of the most important points in connexion with new appliances, and they realized that if there was to be a greatly extended use of gas-consuming apparatus it must not involve gas undertakings in engaging a large staff to see that it was kept in working order. In the last thirty years appliances had become more efficient, and in certain cases that had possibly involved increased maintenance. It was that factor of maintenance in connexion with the gas fire that led them to give serious thought to the possibility of applying the luminous flame. They had found that by using a luminous flame the maintenance of the fire could be very considerably reduced, and there were, in fact, fires that had been in operation throughout the war without any attention at all.

Fashion and Sales Appeal

There were fashions in design, and there was always a great temptation to produce some sort of change so as to create a new fashion. Many people thought the extension of the use of the luminous flame would have a great sales appeal, and the public would be persuaded that it represented a great advance. There were certain advantages that accrued, just as there were with the fixed orifice injector. In the gas fire the luminous burner had obviated troubles due to the choking up of the eddy filters with fluff in bedrooms and elsewhere. With regard to the post-war cost of apparatus one did not know what would be the basic price of commodities after the war, but he did not think there would be any great increase in the cost of gas appliances compared with the appliances that would be offered by competing industries. He anticipated that solid fuel appliances would tend to show a greater increase than those using gas, and that the increase in the cost of electrical appliances would be about equal to those of gas appliances. Uneconomic competition must be eliminated as far as possible. It might be argued that all competition was uneconomical, but he hoped there would still be some competition. He was an individualist and he believed in competition.

Mr. **J. H. Dyde** (Uxbridge) said he had always been an enthusiast for the use of coke, with its high efficiency combined with low thermal cost. Were it not for the fact that many of them had good coke markets they would not be able to sell gas at its present price, and if they went on gasifying coke their price of gas must go up. Colonel Bywater had given some most interesting figures showing the increased number of therms consumed under a promotional tariff, but he felt they must await the results of the development work of Dr. Dent and others, involving changes in their present manufacturing resources, before they could look to the day when gas could completely displace solid fuel. In the meantime it was in their interests to go through the intermediate stage of pushing the consumption of 40 million tons of coal out of the way by the use, primarily, of coke. If they went for that coke market they would not have any difficulty in disposing of the gas which would, under present circumstances, result from its manufacture. He could speak from personal experience about electric cooking, because when he moved some time ago from one district to another the only house he could get was "all electric." He could not imagine how anyone could possibly use an electric cooker if they had had any experience of the use of a modern gas cooker. He had seen a fireplace set in the corner of a lounge, in a somewhat similar position to that indicated in one of Dr. Hartley's modern house illustrations. It was not satisfactory in actual practice, and the ladies did not think so because they could only gather round the fire in an arc of 90°. He felt the right place for the fire was midway along the wall, where it had been for years. On the question of coke production, he felt it was appalling that the Gas Industry nowadays should have the handicap of the ash and the very bad quality of the coal they were receiving. It was having a disastrous effect on their present and potential consumers, and he hoped something could be done to improve the position in that respect.

A Change of Name

Mr. **P. E. Browne** (Brighton) commented on Mr. Tennant's fear as to maintenance costs, and said they did not want appliances so complicated that their maintenance people had difficulty in servicing them. He was confirmed in his opinion that regular inspection and maintenance of appliances by the undertaking, in the consumers' houses, worked to the very great advantage of both parties. He saw no difficulty in providing for the cost of the work. For example, in the case of hire purchase spread over a fair number of years, up to five, the terms were so arranged as to cover the cost of the service. A few years ago they had a fairly large staff on what they called the "complaints section" (a very bad name from the point of view of the Gas Industry). They renamed it the "supply service department," and the change of name conveyed a different impression to the mind of the consumer. They removed the idea of complaints and established instead the principle of regular contact with the consumer on the service side. He was a great believer in the service that a gas undertaking could render to the consumer; that service was far more important than the original installation of a gas-burning appliance, which was often forgotten. Price of gas per therm was not so important as the service that was given. Twenty years ago his company undertook universal maintenance. It cost about one-fifth of a penny per therm to give quarterly visits to every appliance known to the undertaking in its area of supply. It was manifestly impossible to continue that system during wartime, and so a charge was now made except in the case of hire-purchase appliances, which were already priced to allow for maintenance. Some very good work was being done and there were no complaints. Mr. Dyde had taken some exception to what Colonel Bywater had said about the possibilities of promotional tariffs. Here again, his company had been in the field before the war with a promotional tariff. They called it a half-price tariff, half the price being charged as a commodity charge and the other as overhead, the whole of the gas burnt being charged at half price. He could confirm what Colonel Bywater had said, that such a tariff was very promotional indeed. Unfortunately they had to withdraw the tariff when it became unfair owing to the general appeal for fuel economy, but up to that time they were in the happy position of having improved their business in two or three thousand cases. He foresaw some competition from certain solid fuel cookers after the war, but he was hopeful that future research in regard to the gas oven would raise the efficiency much higher than it was at the present time.

Dr. **Hartley** said a question had been raised about the effect of the standardization of calorific values. Standardization of gas quality, which was rather wider than calorific value, would certainly be of advantage in the future. With regard to Mr. Dyde's remarks on coke, one point he (Dr. Hartley) had tried to bring out was the advantage of the combined use of gas and coke in the new modern home, and that would afford its own solution to the problem of the load factor. It must be remembered that immediately prior to the war there was only between six and eight million tons of coke available, and he had said in his Paper that some 40 million tons of bituminous coal was burnt in the homes. Actually 40 millions was an underestimate; it was at least 45 millions, and perhaps as much as 50 millions. If they were going to replace coal by coke they must produce very much more coke. After the war there would still be a big demand for coal-consuming appliances. The solid hotplate, which was one of the points in Mr. Dyde's criticism of the electric cooker, had exercised the minds of the Gas Industry, and they had done some very interesting experiments. They had designed experimental hotplates and handed them to members of their staff for trial in their homes, and they had found that people who were used to the open type did not take kindly to the solid hotplate. Mr. Browne had spoken of consumer service, and he could assure him that the appliance manufacturers realized that consumer service was essential. The manu-

facturer was the more successful in proportion to the extent to which he satisfied his consumers—who were the gas undertakings—and he was sure the same thing applied to the relations of the gas undertakings with the public. He thought they would have more serious competition from solid fuel than from the electrical side after the war so far as cooking was concerned. The wide range of oven efficiencies was rather startling, but it must be remembered that it covered a wide range of small and heavy oven loads.

Influence of the Architect

Mr. **R. S. Falkner** (Chesham) suggested that the Gas Industry's national bodies in the post-war era could render the Industry a great service if they were to direct the attention of the architect in regard to the construction of the cooking quarters in the average household. In the past there had been some excellent circulars and booklets prepared, principally for the information and instruction of the architect, but more frequently than not it had been left to the undertakings themselves to contact the architects concerned. It was said that at least four million houses would be wanted after the war; here were great possibilities for the Gas Industry if it could but overcome the difficulties of making contact with those whose duty it was to design the houses that were to be built. It was common experience to go into a scullery and find the gas cooker jammed in between a wall and a sink, where the housewife scarcely had room to stoop to see to the cooking; or perhaps it was fixed in a direct line of draught. In the larger type of kitchen or breakfast room it was sometimes found that to encourage the sale of the house the builder had put in a solid fuel grate. If architects could be encouraged to develop their plans and provide really good working space for the housewife it would help gas undertakings very much in selling gas and appliances. Personally he thought the ideal means of cooking was the eye level type of cooker, where the housewife had no need to bend or stoop to do her work. Everything was in her line of vision, and she was clear of fumes when the oven door was opened. There were few kitchens where cookers of that type could not be installed to-day. He supported the auxiliary type of water heater because he was of the opinion that they would have great difficulty in ousting entirely the solid fuel water heater. In a great percentage of houses, however, there were obstacles to putting in auxiliary systems. The pipes were sealed in bricks or hidden away in cupboards, and the tank was usually in a very confined space, and they were really up against great difficulties in selling water heaters. It would be a great help if builders could be persuaded to put in supplies when houses were being built; where this was not done it fell on the gas undertaking to bear the cost of putting in the gas. If their national bodies could get to work and contact the architects, not only the bigger men in the architectural field, but the smaller men who operated in the smaller districts, it would be a great help to them in selling appliances and in securing a fuller use of gas.

Dr. **Hartley** said he had made contact with a number of architects in the last year or so, and had spoken to them especially about room heating. He was impressed with the feeling that the architects, especially in the cities, who were going to be responsible for post-war housing, were very much alive to-day to the importance of ensuring satisfactory heat service, cooking conditions, and hot-water supplies. He had put it to them that they ought not to devote too much of their available space to what might be called "pretty" rooms, but that they should pay due attention to what was really wanted. The R.I.B.A. had put forward proposed designs for houses, and it had been said to the appliance makers, "Why don't you design kitchens?" They had to be careful; they were not architects, and the kitchen must be designed with reference to the rest of the house.

Mr. **Tennant** proposed a vote of thanks to Dr. Hartley, and said they should pay tribute to him for the work he had done in the Industry in the development of the domestic utilization of their product. He had done a tremendous amount of pioneer work and he was an authority on his subject. They owed him a debt of gratitude for what he had done and for the subject he had brought forward at that meeting.

Mr. **Dawson** (North Middlesex) seconded the vote of thanks, and spoke of the tremendous advance that had been made in the appliances which the Industry was now able to put out. They must see that they did not murder those appliances by sending out gas containing sulphur, or possessing bad combustion characteristics, or at varying pressures.

Dr. **Hartley,** in a brief reply, said he had seen considerable changes in gas appliances in the 31 years he had spent in the Industry. In coming into contact with representative men in other spheres he had found that when they were informed of the Industry's achievements in the utilization of gas and the study of consumers' interests they were impressed with what the Gas Industry had done. He believed that the gas appliances of to-day were well ahead of the appliances offered by competing fuels. They had a great deal of knowledge at their disposal, and they had no need to worry about the future. Prior to the war gas was used for some 20% of the domestic load. There was therefore still 80% of the field to capture.

The Grey Edition of the Papers which were presented at the 79th Annual General Meeting of The Institution of Gas Engineers in June, 1942, has now been published. The edition is complete with the full discussions and replies.

Infra-Red for Industrial Purposes

In the "JOURNAL" last week (p. 577) we referred to the use of radiant heat in industrial processes, pointing out that for many years the Gas Industry has employed radiant heating where high rates of heat transfer have been required. Processes such as fur drying, sealing-wax polishing, printing ink drying, and, of course, the grilling of meat and bread toasting have been carried out by this means. We pointed out, too, that in recent months the electrical Press has contained information on radiation drying under the title of "Infra-Red," with the result that some may have been led to believe that infra-red rays generated by electrical means have unique properties likely to revolutionize heating processes in general and paint-drying in particular. As a matter of fact, "infra-red" is radiant heating, though in the normal electrical application it has been limited to a range of infra-red rays emitted by the tungsten filament lamp which fall in a comparatively narrow range of the radiant heat spectra.

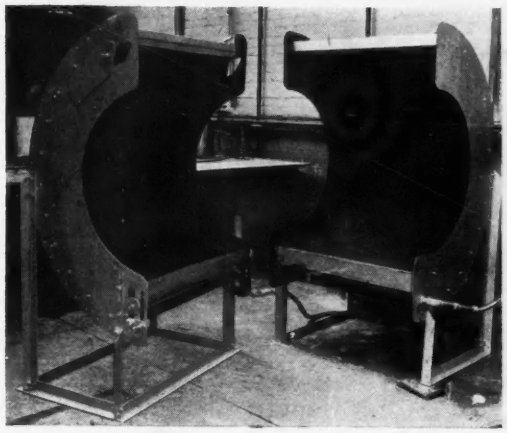


FIG. 1.—*Experimental Medium-Temperature Panels for Paint Curing—opened up.*

The Gas Industry is fully aware of the uses of infra-red heating, and in the available radiant heat sources the Industry is fortunate in having the experience of many years of practical application and research. The sources available are: (1) high temperature panels, such as the Cox (surface) combustor, and the gas fire type; (2) medium temperature panels, of the type commonly employed for space heating. The high temperature panels give a very high flux density, normally of the order of 350 B.Th.U./hour per sq.in. (equivalent to 100 watts per sq.in), compared with the maximum of 35 B.Th.U./hour per sq.in. (equivalent to 10 watts per sq.in.) of the tungsten filament lamp; while the medium temperature panels can be adjusted to give flux densities up to 35 B.Th.U./hour per sq. in. (equivalent to 10 watts per sq.in.) as required. Both types have the advantage of uniform radiation without the use of reflectors, they are of the simplest form of construction, very robust, require little maintenance, and have an operating life of many years. Owing to the simplicity of their construction their initial cost is low, and they require no special installation features other than the normal supplies.

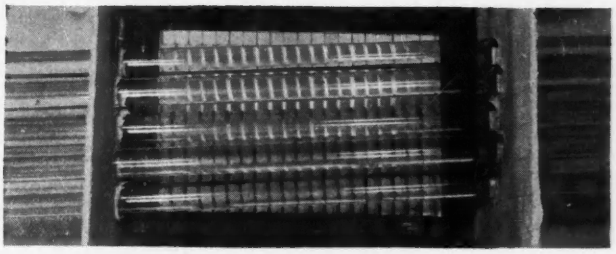


FIG. 2.—*Assembly of High-Temperature Panels for Heating Acids in Tubes—front panel removed.*

Research by the Gas Light and Coke Company at Watson House on the use of infra-red has resulted in the development of special heaters for many industrial purposes, and recently attention has been directed to the special problem of curing the heat transformable paints used for protecting sheet metal objects. Fig. 1 shows two

experimental large medium temperature panels. Such panels can be built up into tunnels of any desired length for this type of work. The results obtained have confirmed earlier experience, and it has been shown that paints requiring 25–30 min. at 250°F. in a convector oven can be dried in about half a minute in this tunnel—and the air temperature in the tunnel is only 15°C. higher than atmospheric. There are no patents or registered designs on this development, and in accordance with the Gas Light and Coke Company's usual policy they are prepared to make any information available to the recognized industrial oven builders, and the manufacturers of industrial gas equipment, also paint manufacturers. It is recognized that from the practical and commercial point of view many improvements in design and appearance can be made.

The use of high temperature sources for the drying of paint on heavy objects such as shells has been developed since the war by a well-known manufacturer of drying ovens; unfortunately, little publicity has been given to these installations, and it is unlikely that detailed particulars could be broadcast in wartime. Full information would, however, be available to anyone engaged on essential work.

The use of infra-red for purposes other than paint drying has also made considerable progress, since the gas high-temperature panel, of which several proprietary types are available, has the great advantage of high flux densities enabling soldering and brazing operations to be carried out on mass production lines. One interesting development investigated by the Gas Light and Coke Company is the heating by means of high temperature panels of acids flowing in glass tubes. Fig. 2 is a photograph of the experimental arrangement with the front panel removed to show the tubes. The panels are mounted on a movable framework, which can be wheeled into any position and gives free access to the tubes if required. Many more applications could be quoted, but these are sufficient to indicate that research by the Gas Industry on this problem to help the war effort has not been lacking.

A number of firms have already shown considerable interest in these developments at Watson House, and recently a test was carried out on a well-known type of petrol can using the same paint as that used when dried in the electric infra-red tunnel, the drying time in the panels shown in fig. 1 being about 4 min.

Electric Gas Treater for Nitric-Oxide Removal*

By WARREN CHURCHILL,
Chief Chemist, Boston Consolidated Gas Company

THE Koppers electric gas treater was placed in service at the Everett plant of the Boston Consolidated Gas Company in April, 1941. This treater was designed for a maximum capacity of 60 million cu.ft. per day of coke oven gas mixed with carburetted water gas. The load, although mainly coke oven gas, would during the winter season contain up to 25% carburetted water gas.

The nitric-oxide content of the coke oven gas entering the plant at Everett fluctuates between 12 and 35 grammes per million cu.ft., which would correspond to 0.9 to 2.5 parts per million by volume. The nitric-oxide content averages 25 grammes per million cu.ft. or 1.8 p.p.m. If this concentration of nitric oxide was allowed to remain in the gas entering the storage holders there would be sufficient vapour-phase gum formed to cause severe pilot-stoppage trouble. The nitric oxide together with the 0.6–0.8% oxygen and certain hydrocarbons normally present in the gas react to form this gum.

The oxidation of nitric oxide to nitrogen peroxide is known to be the time-consuming element, while the reaction of the nitrogen peroxide with the hydrocarbons proceeds very rapidly in producing the vapour-phase gum. This gum is then precipitated as a highly-dispersed suspensoid, which is deposited on pilot needle valves, the seats of thermostatic valves; in fact, any point in the system where there is a sudden change in velocity or direction of gas flow.

In the electric treater, the oxidation of nitric oxide to nitrogen peroxide is accelerated by the use of a brush-type corona discharge, permitting the vapour-phase gum to form and drop out before gas leaves the plant.

The electric gas treater consists of four units connected in parallel to a 42 in. manifold, with 30 in. gate valves on the inlet and outlet of each unit. A unit is made up of two adjacent shells 9 ft. 6 in. in diameter by 13 ft. 3 in. high, tied in near the base so that gas passes through them in series. The outer surfaces of the shells are covered with a 1½ in. layer of insulation which is coated with roofing compound and painted for protection from the weather. The gas entering at the top of the first shell of a unit passes down through an electrode assembly consisting of 14 smooth plates of hardened aluminium which are electrically grounded. Evenly spaced between these, there are 13 discharge electrode plates rigidly fastened together and mounted upon four porcelain insulators.

Each discharge electrode plate contains 4,253 pins which pass through it perpendicularly. These pins made of special alloy steel have swaged points on both ends which project out equidistant from either side of flat plate.

The pins are made to be uniform within a close tolerance and are carefully assembled on the plates so that the swaged points will remain sharp. This is necessary, as efficient operation of the treater depends on the uniform clearance between the points and the smooth grounded electrode, as well as the condition of these points.

Each porcelain insulator supporting the discharge electrodes is located in a separate compartment at the base of the shell. The compartments are heated with copper steam coils so that the insulators can be maintained free from condensation of the moisture present in the gas.

The gas passing down through the electrodes of the first shell is subjected to the brush-type corona discharge which takes place between the many sharp points and the smooth plates of the grounded electrodes.

This gas then enters the second shell at the base and passes up through a second set of electrodes which is a duplicate of the first.

Leaving the treater at the top of the second shell of each unit, the gas, having had its nitric-oxide content converted for the most part to nitrogen peroxide, now goes to the catch boxes. The vapour-phase gum which has formed in the gas leaving the treater drops out in the oxide of the catch boxes or later on in the storage holders.

The treater units are operated on alternating current from a 550/38,000-volt transformer which has taps on the primary winding to give voltages from 34,000 to 38,000 in 1,000-volt steps.

The discharge electrode in the first shell of each of the four units is connected through a 10,000-ohm stabilizing resistance and a disconnect switch to one terminal of the transformer. The discharge electrode in the second shell of each unit is connected through a 10,000-ohm resistance and disconnect switch to the other terminal of the transformer. In this manner the two discharge electrodes in each unit are placed in series in reverse order in respect of each other. According to E. V. Harlow, Koppers Research Division, Koppers Company, the discharge gaps are placed in series for the following reason: A single asymmetrical electrode pair operating in coke oven gas or water gas tends to rectify the current, passing more current on the half cycle when the points are negative. By connecting two gaps in series and in reverse order there is always a point-negative condition in series with a point-positive condition and a symmetrical current wave is drawn from the transformer.

The instrument panel for the treater contains an ammeter, volt meter, and watt-hour meter in the primary circuit. An auxiliary switch on the circuit breaker operates a horn as a warning signal when the breaker is opened by overload. A manually-operated induction regulator is provided to regulate voltage between taps on the transformer. Secondary current is indicated on an ammeter operated from a current transformer cut into the high-tension bus.

Although the four units of the treater are designed to be operated together when the load requires it, in practice just two units have been used at one time. This permits the two idle units to be cleaned and ready for operation when the other two become fouled.

To be sure the insulators are dry, the clean units remain idle for eight hours with the steam coils turned on, before the units are placed in service. In starting up the two units, the primary voltage is adjusted to the maximum that can be carried without undue fluctuations in the secondary amperage, the normal amperage being 0.25 amp. per unit when the electrodes are clean.

The nitric-oxide content of the gas leaving the storage holder is checked daily by the control laboratory. This normally varies between 0.25–0.40 grammes per million cu.ft. If this concentration goes up to 0.50 grammes per million, tests are made to determine the nitric-oxide content of the gas entering and leaving the treater. When in such circumstances the removal at the treater is satisfactory, then tests are made at the catch boxes and the inlet to the storage holders. When the catch boxes are found to be giving up nitric oxide, the trouble can usually be corrected by rotating them. During the summer months in very hot weather the storage holders have been found to give up nitric oxide to the gas.

A test covering an operating period of 115 days for units 1 and 2 has been recently concluded. An average of 56 determinations on the gas entering and leaving the units showed the removal to be 91%. The average inlet and outlet nitric-oxide content was 22.0 and 2.0 grammes per million respectively. The electrical-energy consumption was approximately 170 kw. hrs. per unit per day for this period.

The above results are very good when it is considered that the two units were operating on an average of 12% above their rated gas capacity.

* From a Paper to the New England Gas Association.

The fact that goods made of raw materials in short supply owing to war conditions are advertised in the "Journal" should not be taken as an indication that they are necessarily available for export.